# JOURNAL OF GAS LIGHTING & WATER SUPPLY.

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. CXXVII., No. 2673.] TUESDAY, AUGUST 4, 1914. [66TH YEAR.


## EDITORIAL NOTES.

### The Two Black Spots.

WITH the sinister position of the coal and residuals markets before him, and looking forward, the Governor of the Gas Light and Coke Company (Sir Corbet Woodall), in addressing the proprietors last February, made no secret of his ill-forebodings as to the financial issue of the half year which was then current, and has now closed. He said: "We can "hardly hope to make a less heavy call upon our surplus "funds at the end of the current half year than we are "doing to-day—it will probably be greater." The prediction was justified; but the anticipation has not had quite such a bad realization as that for which Sir Corbet judiciously prepared the proprietors. In the half year ending December last, the draft upon the undivided balance was £96,498; in the past half year, it was £78,739. Therefore last half year has taken less than the preceding one from the undivided surplus by £17,759. Small mercies in these days are something for which to be thankful. The combined figures, however, mean that, during the past twelve months, the undivided balance has been cut down to the extent of £175,237—from £710,551 to £535,314, which is the sum in hand to day, apart from reserves, in the shape of unappropriated funds. But it is not the fault of coal and the markets for coke and sulphate of ammonia that the position is not worse than it is. It is due to good administration, to excellent working, and to the expansion of the gas business, that the result, as we shall show, was not of a far worse character. Sentient directors and officials of high accomplishments are wanted more in times like those through which the gas industry has been passing than in periods when all is rosy and comfortable going. Briefly, the financial tale of the half year is this. The total income was £2,517,308, which was a reduction of £65,729. The total expenditure was £1,978,433, or an increase of £43,583. The set-back in income and the increase in expenditure make together £109,312, which is the amount by which the balance transferred to net revenue—£538,875—is less than the similar item for the corresponding half of 1913. Deducting fixed charges, and placing £15,000 to redemption fund (nothing goes to the special purposes fund again this time), there remains a balance of profit of £319,477, which is £77,610 less than for the first half of last year. With the £614,053 brought into the half year, there is a sum of £933,530 available for dividend. The same distribution is proposed—at the rate of £4 17s. 4d. per cent. per annum; and, after paying this, £535,314 remains to go to the credit of the current accounts.

The causes that have inflicted injury upon the finances of the half year have been coal and coke, and in minor degree sulphate of ammonia. Coke takes premier place in having gone from bad to worse; and it is an almost indescribable "worse." It is in the manufacturing department that things would have been blacker still had administration and good working not come to the rescue. In considering manufacturing materials costs, it must be borne in mind that the half-year's total make of 15,411,624,000 cubic feet of gas contains in it 303,736,000 cubic feet more than the quantity produced in the corresponding period of last year, and this additional make, of course, represents extra outlay. The expenditure on materials used in manufacture was higher by £38,819; the total being £920,392. But there has been considerable transference from coal gas to carburetted water gas during the half year. Had there not been, what with the extra quantity of expensive coal that would have been required, and the lessened use of coke, we are afraid there would have been a further serious enhancement in the cost of manufacturing materials. As a matter of fact, the accounts are charged-up with £13,173 less for coal (the total cost for coal being £788,401); but consider, only £13,173 reduction in cost, while there was a reduction of 100,998 tons in the quantity carbonized! Comparing the two figures, and bearing in mind the extra millions of cubic feet of gas manufactured, one can easily see what might have happened in the absence of prudent operation. As it was, £43,147 extra was spent on oil, and £8845 on coke and breeze, for carburetted water-gas production. Subtracting from these items the £13,173 saved on coal, we have, as mentioned, the cost of manufacturing materials standing at an advance of £38,819. This increase could have been borne with a little more complacency had there not been a reduction in the total receipts for residuals to the amount of £107,672—coke being the ugly spot. This reduction in the income from residuals and the increased cost of manufacturing materials together make £146,491, towards which the increase in gas revenue and meter, stove, and fittings rentals only contributed £41,680.

Reference has been made to the manufacturing operations having, in some measure, assisted in rebutting the adverse circumstances of the half year. At the last meeting of the proprietors, the Chief Engineer (Mr. Thomas Goulden) pledged himself, his staff, and men to continue to do their utmost to relieve the strain of these times; and a very few figures will show that they have fully redeemed this pledge. The quantity of coal carbonized during the half year was 938,104 tons, compared with 1,039,102 tons in the first half of 1913; but the oil used in the manufacture of carburetted water gas amounted to 8,619,000 gallons, which was an increase of 3,114,318 gallons. The total quantity of gas made was 15,411,624,000 cubic feet, of which 3,810,000,000 cubic feet were carburetted water gas; the latter figure being an addition of 1,400,246,000 cubic feet to the make of the June half of last year. From these figures it is found that the 938,104 tons of coal carbonized yielded an average of 12,367 cubic feet of gas, as compared with 12,220 cubic feet in the corresponding half year, and 12,306 in the December half of 1913. It is, in fact, the best per ton figure since the coal strike half of 1912, when pressure of circumstances carried the yield up to 12,600 cubic feet per ton. The increment production per ton, compared with the first half of 1913, multiplied by the tons of coal used, represents no less than 137,901,288 cubic feet, which is more than half of the increase in the sales of gas. It may be pointed out in this connection that the manufacturing wages are down to £96,936, or a reduction of £14,357.

The sales of gas and the expansion of business connections for gas are bright features in the otherwise gloomy half year. When we recollect the brilliant weather in the second three months of the half year, it is fairly safe to assume that the cold weather that contributed to the variety of atmospherical conditions in the first three months is entitled to thanks for the increase in the gas business. If it is not so, then observation has failed us. The percentage increase was only 1·88; but this came upon a percentage increase of 3¼ in the first half of 1913—the second half, by the way, showing a decline of 1·78 per cent. But the 1·88 per cent. increase made a difference in the sales of 259,274,000 cubic feet, and raised the total metered consumption of gas to 14,059,454,000 cubic feet. In income the increased sale was represented by £25,700; the total gas revenue having been £1,723,952. As a matter of fact, the private gas-rental went up £28,260 (making it £1,662,273); the difference being explained by the £61,679 income from public lighting being less by £2560 than the revenue from the same quarter in the corresponding half year. This indicates that private gas consumption was even better than is suggested by the 1·88 per cent. Business connections, as intimated, continue their upward course—7358 new consumers having been linked-up to the mains in the six months, and 23,667 more gas-stoves sold or let on hire. What is also highly gratifying is that, in the total meter, stove, and fittings rental of £237,216, there is £15,980 additional to the sum received under these heads in the June half of 1913.

We are afraid that the two satisfactory aspects of the business to which reference has just been made will not do much to lighten the heaviness of the blot that coke is upon the half-year's accounts. The decrease in the coke receipts is no less than £91,739—the total having been £311,006, against £402,745 a year ago. This collapse in

the coke revenue is not due so much to the quantity disposed of as to the lowness of price obtained; inasmuch as the 438,315 tons sold was only 12,669 tons less than in the corresponding six months. Of course, a portion of this sale is attributable to the additional quantity of carburetted water gas made. The half year also closed with 22,483 tons more coke in store than the quantity with which it opened, as is shown by these figures: In store, June 30, 1913, 93,730 tons; December, 1913, 92,222 tons; June, 1914, 114,705 tons. The increased production of the carburetted water gas not only absorbed more of the coke made, but, to the extent to which carburetted water gas displaced coal gas, this prevented stocks being still further enlarged. The other reductions in the residuals branch were on breeze and sulphate of ammonia—the £23,229 received for breeze being less by £8161; and the £114,438 realized for sulphate of ammonia being less by £14,573. But tar and tar products did their best to relieve the position, by yielding £6801 more—thus raising their contribution to revenue to £101,393. The total receipts from residuals amounted to £550,066; being a net reduction of £107,672.

These are the main features of the half year; and we should stop here were it not that there are two or three other items which have some bearing in minimizing the extent to which the carry-forward has been affected. It is observed that repair and maintenance of works (£245,878) is more by £11,561; and repair, maintenance, and renewals under distribution are all up—the total distribution expenditure (£362,003) being £9871 more than in the first half of 1913. In the capital account, while the outlay in the half year has been £57,265, there is upwards of £77,000 credited as depreciation, which is somewhat more than usual. It is quite clear that, had coke maintained both its market value and demand, the accounts for the half year would have been of a character that would have given much more satisfaction, despite the use of heavy-priced coal, which has been the real cause of the gas consumer being robbed of further consideration in the matter of price. Although the Directors are now in the position to report lower prices for coal under the new contracts, the residuals markets are still weak; and the unappropriated balance has been so much curtailed that the question of the reduction in the price of gas is one that it is quite useless even to contemplate at the moment, though the Governor and Directors would much like to do so. However, coal being now cheaper, with improved residuals markets, a period for recuperation, aided by the release from the obligation to comply with a dual standard of quality (a release which will be obtained under the now unopposed measure in Parliament), the complexion of the situation would be materially altered.

## Experiences South of the Thames.

The trading experiences of the gas industry for the past half year will throughout possess much in common. It can hardly be otherwise in view of the general repressive factors—the high cost of coal, and the slump in the coke market, with the reduced value of sulphate of ammonia. These are things which must leave deep incisions in the half-year's accounts; but fortunately there is good ground to believe that bottom has at length been reached. However, particularly in view of the fact that the South Metropolitan Gas Company is an all-coal-gas company, without carburetted water-gas plant for affording partial relief in the matter of coke, there is very solid reason to congratulate all concerned upon the outcome of the half-year's operations, notwithstanding the statements appearing in the opening paragraphs of the report which it will be the pleasure of the Chairman (Mr. Charles Carpenter, D.Sc.), to present to the proprietors at their meeting to-morrow week. It is not an agreeable statement with which to open a report, that the profit from last half-year's trading falls short by £37,922 of the amount required to pay the dividend to which the proprietors are entitled under the sliding-scale—viz., the rate of £5 9s. 4d. per cent. per annum. The Directors explain that the deficiency is due to the high cost of coal; but that it will be met out of the amount brought forward from the previous accounts. They also mention that the values of bye-products have weakened, especially coke. But those who examine the accounts carefully will come to the conclusion that were it not for these unpropitious conditions—had markets in both directions been normal—the half-year's accounts would have presented an appearance second to none in the history of the Company. Looking at the accounts from the proprietors' point of view, there is found in them a considerable vitality even under the clouded circumstances of the half year, as well as other considerations which diminish the dead-weight of the deficiency of £37,922. The proprietors' point of view is to-day the correct one to take, inasmuch as "the rates at which current "contracts [for coal] have been made point to a return of "more normal prices," and seeing, too, in regard to bye-products, that "the lowest prices appear to have been "reached." There is, by the way, satisfaction in having these deliberate views in a report to which the signature of Mr. Carpenter is appended.

Take the item of coal first. The expenditure upon it in the six months was £436,270, which is less by £7456 than the cost in the first half of the previous year, although the quantity of coal carbonized was 573,156 tons, which is an increase of 4930 tons. It will be interesting to hear from the Chairman how this reduction came about, in view of the larger consumption of coal. The explanation no doubt is a very simple one; but it is not apparent on the face of the accounts. Then in regard to residuals, the income from them of £279,781 is a reduction of £58,787 upon the income from the same sources in the corresponding period of the preceding year. Deducting the sums received for residuals from the cost of coal, we have a net cost for the latter of £156,489, as compared with £105,158 in the first half of 1913—a difference of £51,331, which is entirely attributable to the drop in the value of residuals. But the total revenue from gas being £734,025, this gives an increase on the corresponding half of £17,559; and the rental from meters, stoves, fires, and fittings being £133,546, this gives an extra amount of £7582. These two additions to income supply £25,141; and if we deduct this sum from the £58,787 loss on residuals income, less the £7456 saved on coal—that is to say, £51,331—we find that the effects of the two prominent adverse circumstances have been substantially lightened by the additional gas business (and, as will be seen presently, by excellent manufacturing results); so that £26,190 is the difference against the half year, under the three heads of coal, residuals, and gas alone, in comparison with the first half of the year 1913. Therefore, the difference between this £26,190 and the £37,922 deficiency must be looked for elsewhere in the accounts. To the proprietors the lower figure will not, all things considered, look so ugly as the higher one.

The extra charges on repair and maintenance of works and on repairs and renewals in the distribution department more than account for the difference. The item of repairs and maintenance of works alone is, by the charge of £124,647, up by £16,155; and distribution charges (with a total of £184,238) are higher by the sum of £6000—mostly on account of repairs, maintenance, and renewals. Over these increased charges for upkeep, there need be nothing but complete satisfaction on the part of the proprietors. While on these points, we may call attention to the other more prominent changes on the expenditure side of the revenue account. The purification charges (£18,976) are less by £3057. This reminds us that there is not anything said in the report (nor anything to specially direct attention to the matter in the accounts) in relation to the new "heat" purification plant. But incidentally, referring in the report to the increased quantity of gas sold, it is claimed that this increase indicates the "correctness of the policy of main-"taining a high standard of quality. The official returns "show that the gas sent out by this Company has the "highest illuminating power, the highest heating value, and "the greatest purity of the Metropolitan supplies." The variations in the manufacturing costs (including the additional charge of £16,155 under repairs and maintenance of works) bring out the increase in the total (£649,053) to only £7757. Allusion has already been made to distribution. Passing on, it is seen that there is a higher charge under public lighting, amounting to close upon £2000. On the other hand, there is a reduction of nearly £6000 under the head of rates and taxes; while the management expenses are some £4000 more. There is also a charge of about £7000 less under superannuation, sick, and accident funds. When all is taken into account, the total expenditure of the half year (£975,842) is only £2450 above that of the first half of 1913; while the total receipts (£1,148,812) are some £33,700 less. Under these circumstances, while keeping in mind the disabling effect upon the Company of the high cost of coal, it may be said that, comparatively with the corresponding half of 1913, the greatest blame for the

deficiency is attributable to the bye-products, though if coal prices had been easier even this drawback could have been faced with better heart.

Before concluding, the gas, residuals, and manufacturing experiences of the half year may be examined in a little more detail. The increase in the sale of gas was equal to 2·29 per cent.—better than in either of the two preceding half years, when the additions to consumption were respectively 1·59 and 1·56 per cent. In total figures, the quantity of gas sold in the past six months was 6,883,828,000 cubic feet, or an advance of 154,467,000 cubic feet. In money, as already pointed out, the extra sales brought in £17,559, making the revenue from gas £734,025. Save an addition of £87 to the income from public lamps, the whole of the extra gas revenue came from the private consumers. An indication of the effect of the heating business is obtained from the fact that, of the larger income from private consumers, no less than £15,878 was obtained in the Ladyday quarter; but, despite the early light summery weather in the second quarter, it also boasts an increase of £1593—the receipts for gas in the two quarters being respectively £416,086 and £300,561. Then illustrating how well the foundations of the business are deepening and extending is the addition of £7582 to the meter, stove, fire, and gas-fittings rentals—making the total £133,546. The contributions to the £7582 were: Meters, £815; stoves and fires, £2535; and gas-fittings, £4232. Compared with the figures for the first half of 1913, the number of ordinary meters fixed (95,628) has increased by 303; of slot meters (272,479), by 5679; of ordinary stoves (83,612), by 1526; of slot stoves (226,426), by 5902; and of fires on hire (45,402), by 6743. There, again, the proprietors have good cause for congratulating themselves. Then we come to the dark tale of residuals. Coke is the *bête noir* of the half year. Earlier in this review of the accounts, it has been shown that the total receipts from residual products amounted to £279,781, or a decline of £58,787. Coke, in realizing only £150,249, was responsible for a revenue reduction of £55,460; and it is uncomfortable to see that the stock in store has ascended from 20,876 tons to no less than 105,746 tons in a twelvemonth, although, when it is mentioned that the stock at December last was 70,037 tons, it will be seen that the supplement to stock was less last half year than in the preceding one. Breeze, in producing £8570, gave an increase of £4880; but the yield of £53,872 by tar and tar products was less by £3039, and the yield of £67,089 by sulphate of ammonia was lower by £5171.

Such is the financial position of the half-year's trading of the Company, which position has its good aspects, as well as its bad ones. To the former, excellent working contributed, both in the manufacturing and the gas sales departments. We have seen what has been done in the latter; while in the carbonizing department the average production of gas per ton of coal used has been 12,476 cubic feet, which compares with 12,314 cubic feet in the first half of 1913. In the second half of 1913, however, 12,734 cubic feet were realized; and, as we take it the same coals were then being carbonized as in the past half year, there should be some explanation as to the difference in make. At any rate, the 12,476 cubic feet is an evidence of good working; and in this figure and in others in the accounts, there is ample justification for the statement that the co-partnership employees "work with a zeal and interest impossible of attainment "under any other system." By their aid, with the lower prices of coal, and more especially if the appearance of the lowest prices for residuals having been reached is proved by events to be true, and there is a turn of the tide in this respect, a more favourable financial statement may be anticipated for the current and the succeeding half years. Even the present accounts are not so bad (considered as they have been here) as might have been expected, in view of the abnormal conditions of high coal prices and the simultaneous break in the residuals markets.

## National Illumination Committee.

THE science of illumination cannot now complain of neglect on the part of the technical bodies that are representative of industries and work in which illumination has a primary part. Illumination was not at one time treated as a science. It was merely subject, without much reasoning, to rule-of-thumb and to convenience. Physiological questions arising out of inherent qualities and their effects never appeared at one time to have any claim upon consideration. The measurement of light, too, until the International Commission on Photometry (which was formed at the International Gas Congress in Paris in 1900) set to work, was something that was more or less crude, and it was no one's special business to investigate surrounding problems. What was done in this regard was purely voluntary on the part of individuals without any systematically devised lines of exploration and assistance by conference. But this looseness and absence of concerted action are now things of the past. The elements have been evolved and united by which there can be thorough consideration and investigation of all illumination problems on methodical and co-operative lines, and international agreement in the end. The science of illumination will in this way be largely furthered to universal advantage. For long there has been in existence the organizations representing the agents by which artificial illumination is secured; and from the organizations representing one of these agents, the Photometrical Commission arose. The imposing national homes of scientific research—such as our own National Physical Laboratory—had not given a great deal of serious attention to these problems at the time of the birth of the Photometrical Commission. They have given more since; but there has been even with them until latterly a pursuit of investigation just as it pleased the wills and fancies of individual investigators. This has meant much wasted effort and little progress. Of recent years, however, there have come into existence the Illuminating Engineering Societies; and though not equipped to scientifically carry out investigations into the various problems of illumination, they have done useful work in breaking ground, and disclosing how much there is to be done, and how little has been accomplished which has borne practical result.

The position was therefore quite ripe for the conjunction in useful work of all these corporate bodies. From outside the Photometrical Commission came pressure for the reorganization of that body, with the view of bringing all useful interests and institutions into co-operation, and of extending the field of work beyond the photometrical one. At first there was some resistance. The body was originally appointed by the institutions of one industry for specific objects; and the suggested innovation affected the Commission root and branch. But a little more discussion, and the Commission saw that through expansion lay a clear path to greater serviceableness. So there came into existence the International Commission on Illumination. How wide are the field and the capacity of this new organization are shown by the plain words of one of the articles of its statutes describing its object: "To study all questions connected with "the art of illumination and of the sciences related thereto, "and to establish by suitable means international agree-"ment on questions of illumination." The Commission now represents the gas, electrical, and illuminating engineering institutions of the different countries, and relationship has also been established with the National Laboratories. But matters have been still further advanced along the systematic road, by providing in each country subsidiary supporting bodies to the international one. This is one of the wisest courses that could have been taken, as otherwise the International Commission would have been a sort of floating body, instead of a stable one with a definitely organized foundation. To-day it has concrete foundations in each country, the aggregate for which has been supplied by the various interested technical organizations. These foundations are known as National Illumination Committees.

The National Illumination Committee of Great Britain consists, and will continue to consist, of not more than five representatives each of the Institution of Gas Engineers, of the Institution of Electrical Engineers, and of the Illuminating Engineering Society, and two representatives of the National Physical Laboratory. The new Committee has been brought into existence without ceremony and much advertisement. To its birth and the selection of representatives, there have only been incidental references in reports; and it is because we think that the importance of the work that lies at hand for the National Committee, with the machinery provided for securing an international settlement of scientific problems associated with illumination, entitles the Committee to greater recognition than it has hitherto had, that the opportunity is taken of giving to it this prominent reference. Hidden away in the report of the Council of the Institution of Gas Engineers, there was an allusion to the Committee, and to its purposes. The representatives that had been appointed by the various interested bodies were also named [see June 2, p. 639]. The

Chairman is Mr. Edward Allen, which appointment may be taken as a compliment to the precedence in time of the gas industry in the matter of illumination, and a recognition of the part taken by it in the origin of the International Commission on Illumination through establishing the International Photometrical Commission. The Vice-Chairmen are Mr. W. Duddell, F.R.S., and Mr. A. P. Trotter. The Secretary and Treasurer is Mr. W. J. A. Butterfield, M.A. The first representatives of Great Britain on the Executive Committee of the International Commission are Dr. Harold G. Colman and Mr. Duddell. The Committee will also nominate delegates to the meetings of the International Commission; but the nominations will have to be confirmed by every institution concerned. The rules of the National Committee have just reached us. They are all that are necessary — just simple ones covering the requirements. We see, among other points, that, in respect of the administration expenses of the Committee, and the annual payment from Great Britain to the general funds of the International Commission, they are to be met by each of the three Institutions contributing one-third part. In regard to special investigations undertaken or started by the Committee, the "footing of the bill" will form the subject of special arrangement with the three contributors. A special annual meeting of the National Committee is to be held about the third week in January each year; and other meetings will be called from time to time after consultation with the Executive Committee. With every country represented upon the International Committee, and every country with its National Committee, there ought to be some good work done; and the results should be of an influential order.

## Triple-Controlled Electricity Supply for London.

THE Special Committee of the London County Council who were appointed to consider the question of the formulation of a scheme for the development of electricity supply in London, have produced one which, at the present inchoate stage, will be looked upon with mixed feelings and much misgiving. It is only the rough outline of a scheme that is before us at present [see *ante*, p. 227]; but protruding sharply from it is the fact that the Committee have in view the making of an experiment in London on a gigantic scale, which is a process not as a rule favoured by prudent business men. It is, however, doubtful whether the project will get much farther than the present stage; for the interests involved are so complex and far-reaching, and the territory covered so large beyond the jurisdictional area of the County Council, that there is sure to be considerable and influential opposition, independent of the fact that the scheme proposes to disturb the statutorily created position of 1931, which was attained through much parliamentary conflict. While, too, the Committee's hope of success depends upon a complete acceptance of the plans put forward, there is so much about them that is optional, and nothing that is compulsory (prior to 1931), that electricity concerns which are doing well are not likely to fall readily into the scheme, and will prefer a continuance of separate existence, and development on their own lines. But concerns which are not doing well, and the prospects of which are not rosy, may find in the scheme a means of escape from present and prospective afflictions. As a channel for the investment of money, or for the reinvestment of money (in the case of companies that may be bought up), the proposed new undertaking does not offer anything attractive. Regarding the provision of cheap electricity, there appear to be elements about the scheme for defeating its main object. Therefore, whether the scheme will get much farther depends mainly upon three factors—acceptance by the various authorities concerned, a sufficient number of concerns falling into the scheme at the beginning to enable the plans to be furthered, and the character of the financial case that can be set up. Each of these is a threatening rock. Furthermore, when the Finance Committee of the Council report that they are not inclined to consider the financial aspects of the scheme until something more definite is placed before them, it is improbable that the other authorities concerned, and the owners of the existing electricity undertakings, will be disposed to do so. Having regard to these considerations, it seems hardly possible that the Special Committee can hope to get their outline project satisfactorily filled in, so as to submit it to proper discussion by the County Council and the other interested bodies, in time for presentation to Parliament next session.

Briefly, the scheme is to set up an electrical authority, covering the London County Council area, portions of the areas of five other County Councils, and those of three Borough Councils; and upon the authority all these bodies would have representation. Into the hands, and under the control, of the authority, the whole of the electricity supply of the mapped-out area would ultimately gravitate. To a company, over which the authority would have a large measure of control, the authority's electricity undertaking would be entrusted for a long period of contract; and to serve between the interests of the authority and of the company, there would be a paid expert advisory body. Capital provision would be in the ratio of two-thirds by the authority and one-third by the company. Concentration of generating plant on suitable sites is the ultimate goal; but the Committee have in view gradual development through voluntary co-operation and agreement with existing concerns. The Committee recognize the uncertainty that there is about the maturing of the scheme, by remarking that its actual bringing forward would depend upon the arrangements that could be made with certain of the local authorities and companies for the transfer of some of the existing undertakings to form the nucleus of the new undertaking. The existing concerns that do not consent to be purchased by the municipal-company-expert-advised undertaking prior to 1931 would be able to take from it at a cheap rate any additional current required by them during the remainder of their life, rather than spend money on extensions of their own plant. The Committee have also in view the utilization of existing plants at the initial stage of the scheme, so as to avoid as far as possible the sacrifice of capital.

There we have a mass of uncertainty and complication which is honoured by being called a "scheme," from which it is hoped to derive the advantage of cheaper units for the electricity consumers of London. The investigation of the chances of this happening is the best test to apply to the so-called scheme. There is the extensive area the electricity powers of which it is proposed to place in the hands of the authority and expert controlled company. The object of this is, of course, to get as large a diversity of demand as possible, by roping-in industrial areas, suburban tramway systems and railway lines, the docks, and the residential suburban areas. The Special Committee are aware of the importance, in this matter, of the union of all those areas which are the immediate feeders of London, and which are in turn sustained by London. But the extensive area means a tremendous, and not a coherent working, staff; and this must be very expensive, with the cream of the possible electricity business already in the hands of the electricity suppliers. Centralization of management has not so far been crowned with a brilliant financial success in all lines of public service. Then the electricity authority must have their own offices and staff; and the company will, of course, have theirs. Intervening would be the paid body of experts. Offices, management, staffing, and triple control—all mean money. Complication permeates the scheme; and municipal company-*cum*-expert controlled electricity supply does not look an economic thing. Centralization of generation is expected to produce cheap units. Sir Alexander Kennedy said a short time ago that 75 per cent. of the charges on an electricity undertaking are for capital, distribution, and expenses other than generating ones; the generating costs being about 25 per cent. This being so, it is the 75 per cent. that requires tackling. But there is every appearance of the scheme now before us, through the complexity of the proposed constitution, control, and management, absorbing in itself anything in the shape of economy that may accrue from the concentration of generation.

Going farther with the investigation to form an opinion, from the skeleton information at present at command, as to whether the consumers are likely to be material gainers from the proposition, the financial aspect, as presented in the report by the Special Committee, is worth consideration. Out of net revenue, it is proposed that the authority shall take 4 per cent. on their two-thirds of capital, and the company 4 per cent. on their one-third. Where is the company coming from that, in an immense speculation of this kind, is going to be content with 4 per cent. on its money, as its reward for an enormous responsibility? It may be said the Committee provide for additional profit; but there is a further charge of 2½ per cent. to be earned before the company can begin to realize anything to supplement the 4 per cent. For the whole of the capital, it is suggested that a sinking fund of 2 per cent. shall be provided. Then a reserve fund of ½ per cent. on the capital is to be arranged for. This may be good

finance under the circumstances; but there we have already charges equal to 6½ per cent. on the capital to be provided by the profits, of which the shareholders are only to get 4 per cent. If there are any surplus profits—the "if" may be very strongly emphasized—they are to be divided equally between the authority and the company. We take it that this means not divided in proportion to the capital furnished, but simply halved; and this halving of the surplus would go on until, if ever, the company received 8 per cent. on its one-third part of the capital. The authority, holding two-thirds of the capital, would by this time be getting 6 per cent. on it. Thus in respect of one-third of the capital, the charges, including sinking fund and reserve fund, would be equal to 10½ per cent., and similarly on two-thirds to 8½ per cent. This does not look very healthy for the users of electricity. But they are promised participation after the distribution of revenue has been so far accomplished. If (the "if" may now be doubly accentuated) there is any further profit, 75 per cent. of it, it is proposed, shall be utilized in giving a rebate on the prices charged to the consumers; and the remaining 25 per cent. is to be divided equally between the authority and the company. But the Special Committee have evidently some idea that this mode of distributing this highly visionary remnant of profit may not be agreeable to the local authorities whose ideal objective in municipal trading is a profit in aid of the rates; and so it is suggested that power shall be obtained to utilize the profits received from the undertaking in excess of the capital charges and establishment expenses either for the relief of the rates in the areas represented on the authority, or for purposes connected with the undertaking, just as may be deemed desirable.

Looking at the immature scheme from all points of view, complexity and cost appear to threateningly hover over it; and it is as yet utterly impossible, by the most minute examination at present permissible, to find the benefits that it was the whole intention that any new scheme should serve. Indeed, the public and the patrons of electricity appear to be the very last people who have troubled the thoughts of the Special Committee in designing this pretty project for a much-controlled undertaking, with a contemplated back-breaking financial burden. The Committee must get much closer to a determinate scheme before the London County Council and the other interests concerned, let alone Parliament, will give their consent to its development; for as the scheme stands at present, there is ground for thinking that it is more likely to imperil than to advance the interests of electricity supply in London.

## NOTES FROM ABROAD.

### Bad Weather Increases Gas Consumption.

Boston (U.S.A.) has lately been having some unseasonable weather which has had a favourable effect on the output of the Consolidated Gas Company; prevalence of cold and rain causing the largest augmentation in gas consumption which has taken place in two years. In the week ended the 6th ult., there was an increase of 19·8 per cent. compared with the corresponding period of 1913. The subsidiaries of the Massachusetts gas companies in East Boston, Quincy, and Newton also had largely increased outputs.

### Gas Supply in Portland (Me.).

The growth of the Portland (Me.) Gas Company has necessitated the erection of new offices. The building is a notable addition to the business structures; and, for all the services of a gas company, it is stated to be unsurpassed in any American city of similar size. The Company was incorporated in 1849, and organized in 1850; and its operations have been attended with unvarying success. In 1864, with a price of $3·80, 1859 consumers, the gas used was 21,109,000 cubic feet. Last year, the price was $1, the number of consumers 11,500, and the gas consumption 259 million cubic feet. The extent to which gas is employed for other than illuminating purposes may be judged from the fact that there are in use upwards of 9000 ranges and cookers, 4600 heaters and regulators, 1000 water-heaters, and 5000 gas-irons, hot plates, &c. The output of gas this year is expected to be nearly 275 million cubic feet.

### Attractive Poster Stamps.

A little advertising hint that, to the best of the knowledge of "Gas Record," is new, has been undertaken by the People's Gas Light and Coke Company, of Chicago, in the form of miniature bill boards or "poster stamps," about 2¾ in. by 1¾ in. in size, shown in several colours. These stamps, it is stated, are now going out as "stickers" on envelopes, bill heads, packages, &c., at the rate of thousands a month. The Company find a great demand for the stamps from collectors. Among the subjects touched on are these: "Gas Broiler and Roaster;" "Amber Glow Gas Light—A Great Volume of Light for Little Money;" "Hotel Ranges—All Hot-Top;" "Gas for Industrial Fuel—Concentrated Heat under Perfect Control;" "The Gas Arc—A Great Volume of Light for Little Money;" "Capacity 1500 Loaves per Day—Gas Bake-Oven;" "Inexhaustible Supply—Like a Pipe-Line to Hot Springs—New Automatic Water-Heater;" "People's Gas Demonstration Laboratory—Your Test of Our Gas-Fired Appliances, Using Your Own Materials."

## PERSONAL.

Mr. JOHN MEWS, one of the Directors of the South Metropolitan Gas Company, has been elected Master of the Clothworkers' Company, in succession to Sir Melvill Beachcroft.

At the meeting of the Leicester Town Council last Tuesday, the salary of Mr. G. T. EDWARDS, the Water Engineer and Manager, was increased by £150 per annum, as from the 1st of June.

Mr. WALTER GREGSON, Works Superintendent at the Eastcroft Station of the Nottingham Corporation gas undertaking, has been appointed Manager, in the place of the late Mr. T. Cross, to the Cannock, Hednesford, and District Gas Company, Limited.

The Directors of the Rhymney and Aber Valleys Gas and Water Company have appointed Mr. BARTON GRAINGER, JUN., Assistant Manager to the Hartlepool Gas and Water Company, Manager to the Company. Applications for the position were invited in the "JOURNAL" for the 7th ult.

At their meeting last Wednesday, the Directors of the Bath Gas Company appointed Mr. C. E. D. VALON, who is at present an Assistant to Mr. Hubert Pooley at the Leicester Gas-Works, as Assistant Engineer and Manager, under Mr. C. Stafford Ellery. Applications for the position were invited in the "JOURNAL" for the 7th ult.

Mr. D. J. BRANSON has been appointed Assistant-Manager to the Kettering Gas Company. For the past three-and-a-half years he has been engaged as pupil and assistant to his uncle, Mr. A. W. Branson, the Manager and Secretary of the Rhymney and Aber Valleys Gas and Water Company; while before that he spent three years with Messrs. Drakes Limited, of Halifax.

## OBITUARY.

### THOMAS GUYATT.

THE death occurred last Tuesday, in his eighty-first year, of Mr. Thomas Guyatt, for some years Secretary of the Ottoman Gas Company—a position which he relinquished rather more than two years ago, and was succeeded by Mr. A. W. Cooper. In announcing Mr. Guyatt's resignation at the half-yearly meeting in March, 1912, the Chairman (Mr. A. M. Paddon) referred to the thoroughness with which he had served the Company. He said the Directors valued his services in the highest possible degree; and they felt that the severance, though inevitable on account of advancing years and failing health, would be greatly regretted by everyone connected with the Company.

Mr. Guyatt was known to some of our readers from his association with other gas undertakings. He was a Director of the Ceará Gas Company, of which he was for several years Secretary He was succeeded in this position by one of his sons—Mr. George Rait Guyatt—who died three years ago. He had held it since 1909, when his father was elected a member of the Board on the death of Mr. Horatio Brothers. Mr. Guyatt was an accountant by profession, and was for about twenty-five years an Auditor of the Malta and Mediterranean Gas Company. He filled a similar position with the South Suburban Gas Company for thirteen years, relinquishing it at the half-yearly meeting in February last year. On that occasion, the Chairman (Mr. Charles Hunt) said they were all sorry to lose his services, as he was an exceedingly capable man, and was very acceptable to the Board. They hoped he would be spared for many years to attend the meetings, and give them his countenance and advice. Mr. Guyatt was also Secretary of the Bahia Gas Company for some years prior to its liquidation; the Company being bought out by the Municipality at the termination of the concession.

Deceased was one of the few remaining links connecting the present with the past of the gas supply of the Metropolis, as in early life he was associated with the late Mr. Alexander Angus Croll and was connected with several companies in which Mr. Croll was interested. We believe he did a large amount of work on the arbitration proceedings with the Great Central Gas Company, which, with the City of London Company, was amalgamated with the Gas Light and Coke Company in 1870.

Mr. Guyatt's kind disposition was well known and appreciated by all with whom he came in contact. His name will continue to be associated with the gas industry, as his son is the Engineer, Manager, and Secretary of the City of Ely Gas Company, Limited. The funeral took place at All Souls' Cemetery, Kensal Green, last Saturday.

# THE GAS LIGHT AND COKE COMPANY.

## Half-Yearly Report.

THE following is the report of the Directors of the Gas Light and Coke Company for the half year ended the 30th of June, which, with the accounts (some particulars from which are given below), will be presented at the ordinary general meeting on Friday.

The accounts for the past half year show that, after providing for fixed charges and setting aside £15,000 towards the redemption fund, there remains a profit balance of £319,477 7s. 9d. The amount brought forward from the previous half year being £614,052 16s. 5d., there is a total available balance of £933,530 4s. 2d., out of which the Directors recommend the payment of a dividend on the ordinary stock at the rate of £4 17s. 4d. per cent. per annum, which will absorb £398,164 2s. 10d.

The sum to be carried forward to the credit of the current half year is £535,314 1s. 4d.

The sales of gas for the half year show an increase of 1·88 per cent. on the quantity sold during the corresponding period of 1913.

There has been an increase during the past six months of 7358 in the number of consumers, and of 23,667 in the number of gas-stoves sold and let on hire.

The Directors are glad to be able to report that contracts for the supply of coal to the Company during the twelve months commencing on the 1st of July show a reduction in price as compared with the altogether abnormal figure at which the contracts just expired were made. On the other hand, the market for residuals is a weak one.

The Bill in Parliament, approved by the proprietors on the 6th of February last, providing for the abolition of the illuminating power test as applied to gas supplied by the Company and for the retention of a calorific test only, has been passed by the House of Lords, and now stands referred to the Committee on Unopposed Bills of the House of Commons. It is hoped that the Royal Assent will be obtained prior to the General Meeting to be held on the 7th of August.

The Court of Directors has been furnished by the several Engineers of the Manufacturing and Distributing Departments with certificates that all the Company's works and plant have been maintained in thorough efficiency.

CORBET WOODALL, *Governor.*

*Horseferry Road, Westminster, S.W., July 20, 1914.*

## The Accounts.

The accounts accompanying the report consist of the usual statements.

The statement of capital (stock) sets forth that the total paid-up is £10,413,480; added on conversion, £12,832,955—total amount authorized, £23,246,435. Deducting the amount redeemed, £221,290, the total amount of the Company's existing capital powers is £23,025,145. The statement of loan capital stands thus: Total paid up, £3,186,660; added on conversion, £1,618,190; unissued, £750,000—total amount authorized, £5,554,850.

The capital account shows receipts (with premiums, £1,688,957 14s. 8d.) to the amount of £29,518,952 14s. 8d. The expenditure is shown in the following items:—

| | | | |
|---|---|---|---|
| Expenditure to Dec. 31, 1913 | | | £14,930,437 10 9 |
| Expenditure during the half year to June 30, 1914—viz., | | | |
| Buildings and machinery in extension of works | £2,650 6 6 | | |
| New and additional mains and service-pipes | 14,752 2 6 | | |
| Do. do. meters | 14,550 17 8 | | |
| Do. do. stoves | 25,311 18 5 | | |
| | | 57,265 5 1 | |
| | | | £14,987,702 15 10 |
| By sale of surplus land | £4,321 1 7 | | |
| „ depreciation of plant | 16,302 11 2 | | |
| „ depreciation of meters and stoves | 60,795 8 10 | | |
| | | 81,420 1 7 | |
| Total expenditure | | | £14,906,282 14 3 |
| Nominal amount added on conversion | | | 14,451,145 0 0 |
| | | | £29,357,427 14 3 |
| Deduct amount of capital redeemed under Company's Act of 1903 | | | 221,290 0 0 |
| | | | £29,136,137 14 3 |
| Balance of capital account | | | 382 815 0 5 |
| | | | £29,518,952 14 8 |

The total of the net revenue account is £1,157,928 2s. 3d., compared with £1,360,705 at June 30, 1913. The balance applicable to the redemption fund and to dividend on the ordinary stock is £948,530 4s. 2d.; and the following statement shows how it is proposed to appropriate it:—

| June, 1913. | | | |
|---|---|---|---|
| £712,387 | .. | Net balance brought from last account | £614,052 16 5 |
| 412,088 | .. | Net revenue for the half year | 334,477 7 9 |
| £1,124,475 | | | £948,530 4 2 |
| 15,000 | .. | Contribution to redemption fund | 15,000 0 0 |
| £1,109,475 | | | £933,530 4 2 |
| (£ 17s. 4d. p. ct.) | | Dividend on the ordinary stock— | |
| £398,742 | .. | £4 17s. 4d. per cent. per annum on £16,362,910 | 398,164 2 10 |
| 181 | .. | Forfeitures for deficiency in illuminating power | 52 0 0 |
| £710,552 | .. | Balance carried to next account | £535,314 1 4 |

The three statements relating to the reserve, special purposes, and depreciation funds stood as follows on June 30: Reserve fund, £72,432; special purposes fund, £298,246; depreciation fund, £87,476.

The following is the revenue account:—

*Expenditure.*

| June Half Year, 1913. | | £ s. d. | £ s. d. |
|---|---|---|---|
| | Manufacture of gas— | | |
| £801,574 | Coal, including all expenses thereon | 788,401 11 0 | |
| 37,263 | Oil „ less value of oil tar | 80,410 3 4 | |
| 42,736 | Coke and breeze used in the manufacture of carburetted water gas | 51,581 13 11 | |
| 15,919 | Salaries of Engineers and other officers at works | 15,941 6 9 | |
| 111,293 | Wages | 96,936 15 11 | |
| 18,511 | Purification | 14,745 16 2 | |
| 234,317 | Repair and maintenance of works and plant, materials and labour, less received for old materials, £2087 16s. 7d. | 245,878 14 2 | |
| | Distribution of gas— | | 1,293,896 1 3 |
| 60,358 | Salaries and wages of officers (including rental clerks) | 61,276 14 4 | |
| 95,138 | Repair and maintenance of mains and service-pipes, &c. | 99,753 3 10 | |
| 79,709 | Repair and renewal of meters | 81,767 13 3 | |
| 89,448 | „ „ stoves | 98,402 5 11 | |
| 27,479 | Gas fittings, including labour (automatic meter supplies) | 20,803 14 10 | |
| | | | 362,003 12 2 |
| 26,775 | Public lamps—lighting and repairing | .. | 26,234 0 9 |
| | Rents, rates, and taxes— | | |
| 7,105 | Rents payable | 7,163 9 8 | |
| 166,686 | Rates and taxes | 168,171 10 6 | |
| | | | 175,335 0 2 |
| | Management— | | |
| 3,750 | Directors' allowance | 3,750 0 0 | |
| 300 | Company's Auditors and Assistant | 304 4 0 | |
| 9,192 | Salaries of General Manager, Secretary, Accountant, and clerks | 9,535 18 0 | |
| 26,730 | Collectors and cashiers | 27,021 10 6 | |
| 5,695 | Stationery and printing | 4,985 7 4 | |
| 6,500 | General charges | 6,508 17 9 | |
| | | | 52,105 17 7 |
| | Co-partnership, for twelve months to June 30, 1914 | 45,653 3 10 | |
| 22,966 | Less on Account | 23,000 0 0 | |
| | | | 22,653 3 10 |
| 1,047 | Parliamentary charges | .. | 2,079 5 4 |
| 1,300 | Law charges | .. | 1,502 5 8 |
| 6,411 | Bad debts | .. | 4,974 12 0 |
| 500 | Depreciation fund for works on leasehold lands | .. | 500 0 0 |
| 27,282 | Annuities to officers and workmen, including contribution to officers' superannuation fund | .. | 27,486 14 8 |
| 2,702 | Workmen's compensation account | .. | 3,192 9 11 |
| 4,275 | Company's Contribution under National Insurance Act, 1911 | .. | 4,526 7 8 |
| | Public officers— | | |
| 1,258 | Gas Referees and Official Auditor | 1,258 6 10 | |
| 631 | Public testing-stations | 685 6 3 | |
| | | | 1,943 13 1 |
| £1,934,850 | | | 1,978,433 4 1 |
| 648,187 | Balance carried to net revenue account | | 538,875 5 10 |
| £2,583,037 | | | 2,517,308 9 11 |

*Revenue.*

| June Half Year, 1913. | | £ s. d. | £ s. d. |
|---|---|---|---|
| | Sale of gas— | | |
| | Per meter at 2s. 6d., 2s. 10d., and 2s. 2d. | | |
| £1,634,013 | per 1000 cubic feet | 1,662,273 5 6 | |
| 64,239 | Public lighting and under contracts | 61,679 10 10 | |
| | | | 1,723,952 16 4 |
| £1,698,252 | | | |
| 72,379 | Rental of meters | .. | 74,416 0 4 |
| 67,063 | Rental of stoves | .. | 72,579 19 0 |
| 81,794 | Rental of fittings | .. | 90,220 2 5 |
| | Residual products— | | |
| £402,745 | Coke, less £38,163 10s. 2d. for labour, &c. | 311,006 2 8 | |
| 31,390 | Breeze, less £11,653 19s. 11d. „ „ | 23,229 10 3 | |
| 94,592 | Tar and tar products | 101,393 2 2 | |
| 129,011 | Ammoniacal liquor and sulphate of ammonia | 114,438 0 0 | |
| | | | 550,066 15 1 |
| £657,738 | | | |
| £5,498 | Rents receivable | | 5,771 19 3 |
| 313 | Transfer fees | | 300 17 6 |
| £2,583,037 | | | 2,517,308 9 11 |

The following statements relate to the working:—

*Statement of Coal, &c., Used.*

| Description of Coal. | In Store Dec. 31, 1913. | Received During Half Year. | Carbonized During Half Year. | Used During Half Year. | In Store June 30, 1914. |
|---|---|---|---|---|---|
| | Tons. | Tons. | Tons. | Tons. | Tons. |
| Common | 255,909 | 906,910 | 936,908 | 1734 | 224,177 |
| Cannel | 9,783 | .. | 1,196 | .. | 8,587 |
| Total | 265,692 | 906,910 | 938,104* | 1734 | 232,764 |

* In addition to this quantity of coal, 8,619,000 gallons of oil were used during the half year.

*Statement of Residual Products.*

| Description. | In Store, Dec. 31, 1913. | Made During Half Year. | Used During Half Year. | Sold During Half Year. | In Store June 30, 1914. |
|---|---|---|---|---|---|
| Coke—tons | 92,222 | 580,881 | 120,083 | 438,315 | 114,705 |
| Breeze—tons | 14,105 | 108,913 | 15,526 | 100,742 | 6,750 |
| Tar, from coal only—galls. | 1,361,485 | 9 789,275 | 9,594,001 | 507,667 | 1,049,092 |
| Ammoniacal liquor—butts | 25,616 | 280,768 | 282,714 | .. | 23,670 |

*Statement of Gas Made, Sold, &c.*

| Quantity Made. | Quantity Sold. | | Total Quantity Accounted for. | Number of Public Lamps. |
|---|---|---|---|---|
| | Public Lights and Under Contracts (Estimated). | Private Lights (per Meter). | | |
| Thousands. | Thousands. | Thousands. | Thousands. | |
| *15,411,624 | 467,073 | 13,592,381 | 14,252,531 | 45,108 |
| †15,107,888 | 472,744 | 13,327,436 | 13,984,999 | 46,080 |

* Including 3,810,000,000 cubic feet of carburetted water gas. † June half year, 1913.

The remaining statement is the balance-sheet, which gives the value of the stores on hand at the close of the half year as follows: Coal, £197,924; gas oil, £38,014; coke, £60,220; tar and ammoniacal liquor and products, £82,993; and sundries, £336,247. The figures this time last year were: Coal, £124,553; gas oil, £23,804; coke, £60,260; tar, ammoniacal liquor, and products, £101,589; sundries, £299,835.

## SOUTH METROPOLITAN GAS COMPANY.

### The Directors' Report and the Accounts.

THE following is the report of the Directors of the South Metropolitan Company for the six months ended the 30th of June, which, with the accounts (an abstract of which appears below) will be presented to the proprietors at the half-yearly meeting to-morrow week.

The profit for the past half year falls short by £37,922 of the amount required to pay the dividend to which the shareholders are entitled under the Sliding-Scale Act—viz., at the rate of £5 9s. 4d. per cent. per annum.

The high cost of coal and its freight has been the cause of the deficiency, which will be met out of the amount brought forward from the last account. Fortunately, the rates at which current contracts have been made point to a return of more normal prices; but permanent relief cannot be expected until a more satisfactory basis of remuneration is adopted for those engaged in the industry of coal mining.

The values of all bye-products have weakened—especially coke; but the lowest prices appear to have been reached.

The increase in the gas sold has been 2·29 per cent. This indicates the continued popularity of gas for its manifold uses, and, incidentally, the correctness of the policy of maintaining a high standard of quality. The official returns show that the gas sent out by this Company has the highest illuminating power, the highest heating value, and the greatest purity of the Metropolitan supplies.

The sale of gas by means of coin-meters continues to improve. In this connection, it is interesting to record the fact that whereas five years ago the number of robberies from these meters amounted to 3386, the figure has now fallen to 1621, though some 37,000 more are in use. The money-boxes and locks have been made more secure, and, as fast as practicable, the older pattern meters will be brought up to date in this respect.

The relationship of the Company and its employees, brought about by co-partnership, continues in the highest degree a cordial one. The latter work with a zeal and interest impossible of attainment under any other system; and, in return, they obtain a security of employment and other advantages which could not be given under ordinary conditions.

CHARLES CARPENTER, Chairman.

709, *Old Kent Road, S.E., July* 29, 1914.

### The Accounts.

The following are the principal portions of the accounts accompanying the preceding report.

The first two statements relate, as usual, to the stock and loan capital. The former sets forth that the standard rate of 4 per cent. is payable on £6,011,224 and £418,671 (Act of 1901) of stock; while the latter shows that the loan capital, the rate of interest on which is 3 per cent., amounts to £1,798,994 and £96,451 (Act of 1901). The third statement is the capital account. It stands as follows: Amount received, £5,328,820; nominal amount added by conversion (less premium), £2,996,520—total, £8,325,340. The items of expenditure are as follows:—

| | | |
|---|---|---|
| Capital account to Dec. 31, 1913 | | £5,095,629 8 6 |
| Expenditure during half year to June 30, 1914—viz.: | | |
| New and additional mains and services | £1,594 3 4 | |
| New and additional meters | 1,156 8 4 | |
| New and additional stoves | 1,762 13 8 | |
| | | 4,513 5 4 |
| Tota expenditure | | £5,100,142 13 10 |
| Balance | | 228,677 6 2 |
| | | £5,328,820 0 0 |
| Nominal amount added by conversion, less premium | | 2,996,520 0 0 |
| Total | | £8,325,340 0 0 |

The net revenue account shows a sum of £202,498 16s. 7d. applicable to dividend on the ordinary stock. Following this are the statements relating to the reserve, renewal, and insurance funds. They show that the balances on June 30 were as follows: Reserve fund, £196,106; renewal fund, £24,525; insurance fund, £20,700.

The following is the revenue account:—

*Expenditure.*

| | | |
|---|---|---|
| Manufacture of gas— | | |
| Coal into store, including £3458 11s. 8d. for London Port and tonnage dues | £436,270 11 8 | |
| Purification | 18,976 4 4 | |
| Salaries of Engineer and Officers at works | 19,350 14 6 | |
| Wages (carbonizing) | 49,807 16 0 | |
| Repairs and maintenance of works and plant, less £3030 3s. 3d. received for old materials | 124,647 18 3 | |
| | | £649,053 4 9 |
| Co-partnership | | 29,188 18 10 |
| Distribution of gas— | | |
| Repair, maintenance, and renewal of mains and service-pipes | £43,488 15 3 | |
| Salaries and wages of officers, including rental clerks | 22,350 10 9 | |
| Repair and renewal of meters | 31,376 1 2 | |
| Repair and renewal of stoves | 44,683 17 10 | |
| Repair and renewal of gas-fittings | 42,339 9 2 | |
| | | 184,238 14 2 |
| Public lamps, labour and materials £16,714 19s. 4d., less £14,334 3s. 7d. received for the same | | 2,380 15 9 |
| Rents, rates, and taxes— | | |
| Rents payable | £1,395 10 6 | |
| Rates and taxes | 52,460 8 7 | |
| | | 53,855 19 1 |
| Management— | | |
| Directors' allowance | £2,848 8 9 | |
| Salaries of Secretary, Accountant, and clerks | 4,838 5 0 | |
| Collectors { Ordinary | 5,944 6 6 | |
| Collectors { Slot meter | 10,958 8 0 | |
| Stationery and printing | 5,095 16 8 | |
| General charges | 12,855 9 3 | |
| Company's Auditors | 112 10 0 | |
| | | 42,653 4 2 |
| Miscellaneous— | | |
| Law charges | | 386 16 0 |
| Parliamentary charges | | 193 9 10 |
| Bad debts | | 1,434 5 9 |
| Stolen from 1621 slot meters broken open | | 264 9 2 |
| Superannuation, sick, and accident funds | | 8,059 1 11 |
| National Insurance Act charges | | 3,389 11 1 |
| Gas Referees and Official Auditor | | 239 9 0 |
| Leasehold renewal fund | | 500 0 0 |
| Total expenditure | | £975,842 19 6 |
| Balance carried to net revenue account | | 172,969 8 9 |
| | | £1,148,812 8 3 |

*Receipts.*

| | | |
|---|---|---|
| Sale of gas— | | |
| Lady-Day, at 2s. 2d. per 1000 feet | £416,086 7 7 | |
| Midsummer, at 2s. 2d. per 1000 feet | 300,561 8 1 | |
| | £716,647 15 8 | |
| Public lighting | 17,377 17 5 | |
| | | £734,025 13 1 |
| Company's meters at rent: Ordinary, 95,628; slot, 272,479 | £42,276 18 11 | |
| Company's stoves at rent: Ordinary, 83,612; slot, 226,426; fires, 45,402 | 38,167 3 6 | |
| Gas-fittings | 53,102 13 9 | |
| | | 133,546 16 2 |
| Residual products— | | |
| Coke, less labour and cartage | £150,249 9 4 | |
| Breeze, " " | 8,570 12 3 | |
| Tar and tar products, less labour | 53,872 14 3 | |
| Sulphate of ammonia " " | 67,089 0 4 | |
| | | 279,781 16 2 |
| Rents receivable | | 1,354 15 4 |
| Transfer fees | | 103 7 6 |
| Total receipts | | £1,148,812 8 3 |
| Total amount paid in salaries for half year, £47,293 17s. 4d. | | |
| " " " wages " £305,478 18s. 5d. | | |

The following tables relate to working:—

*Statement of Coal.*

| In Store Dec. 31, 1913. | Received During Half Year. | Carbonized During Half Year. | Used During Half Year. | In Store June 30, 1914. |
|---|---|---|---|---|
| Tons. | Tons. | Tons. | Tons. | Tons. |
| 187,161 | 568,056 | 573,156 | 1005 | 181,056 |

*Statement of Gas Made, Sold, &c.*

| Quantity Made. | Quantity Sold. | | Total Quantity Accounted for. | Number of Public Lamps. |
|---|---|---|---|---|
| | Public Lights (estimated). | Private Lights (per Meter). | | |
| Thousands. | Thousands. | Thousands. | Thousands. | |
| 7,150,631 | 177,696 | 6,706,132 | 6,970,083 | 24,749 |

*Statement of Residual Products.*

| Description. | In Store Dec. 31, 1913. | Made During Half Year. | Used During Half Year. | Sold During Half Year. | In Store June 30, 1914. |
|---|---|---|---|---|---|
| Coke—tons | 70,037 | 353,739 | 106,297 | 211,733 | 105,746 |
| Breeze—yards | 18,736 | 171,392 | 57,218 | 59,474 | 73,436 |
| Tar—gallons | 414,993 | 5,488,580 | 5,491,771 | 19,083 | 422,719 |
| Ammoniacal liquor—butts | 10,240 | 218,444 | 220,572 | .. | 8,112 |

The remaining statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows: Coal, £137,573; coke and breeze, £60,276; tar, ammonia, and products, £71,078; and sundry plant and stores, £331,157. The figures this

time last year were: Coal, £83,735; coke and breeze, £16,431; tar, ammonia, and products, £98,440; and sundry plant and stores, £343,584.

A sum of £63,301, co-partnership bonuses and savings, has been deposited with the Company; and the total of the superannuation and guarantee funds is £71,305. The figures last year were £48,361 and £66,807.

## COMMERCIAL GAS COMPANY.

### Half-Yearly Report.

THE following is the report, for the six months ended the 30th of June, which the Directors of the Commercial Gas Company will present at the half-yearly meeting on Thursday.

The Directors submit the accounts for the half year ended June 30, 1914. The revenue account shows a net profit for the half year of £50,426 14s. 2d., which, added to the balance of £93,518 17s. 11d. brought forward from the previous half year, produces a net revenue balance of £143,945 12s. 1d. Deducting therefrom £8079 16s. 4d. for interest, there remains standing to the credit of the net revenue account a balance of £135,865 15s. 9d. available for dividend. The Directors recommend the payment of dividends thereout at the rates of £5 9s. 4d. per cent. per annum upon the 4 per cent. stock of the Company, and of £5 6s. 8d. per cent. per annum upon the 3½ per cent. stock, both less income-tax. The balance of the net revenue will be carried forward to the next half year.

WILLIAM GRAHAM BRADSHAW, Chairman.

*Gas-Works, Stepney, July 29, 1914.*

### The Accounts.

The accounts accompanying the report consist of the usual set of statements. They show that the paid-up stock on the 30th of June amounted to £996,405; that £1,076,875 had been added by conversion, making £2,073,280; and that £149,298 remained unissued out of the total authorized capital (including premiums) of £2,235,000. The total amount borrowed on the above-named date was £339,062 10s., and £135,937 10s. was added by conversion; making a total of £475,000, and leaving £79,226 to be borrowed out of the £550,000 authorized. Capital account receipts amount, with premiums, to £2,606,065 4s. 5d. The expenditure stands at £1,448,531 2s. 2d., with a nominal amount of £1,212,812 10s. added by conversion—together, £2,661,343 12s. 2d. There is thus a balance of £55,278 7s. 9d. carried to the balance-sheet. A sum of £1827 was expended during the half year on new and additional mains, services, stoves, &c.; but £861 is credited for prepayment meters and fittings. The reserve fund amounted at the close of the half year to £39,689, and the insurance fund to £33,749.

The following statements relate to the working:—

*Statement of Coal and Oil.*

| — | In Store Dec. 31, 1913. | Received During Half Year. | Carbonized During Half Year. | Used and Sold During Half Year. | In Store June 30, 1914. |
|---|---|---|---|---|---|
| | Tons. | Tons. | Tons. | Tons. | Tons. |
| Coal | 22,190 | 97,333 | 93,918 | 528 | 25,076 |
| Oil—gallons | 534,154 | 1,214,369 | 1,259,122 | .. | 489,401 |

*Statement of Residual Products.*

| Description. | In Store Dec. 31, 1913. | Made During Half Year. | Used During Half Year. | Sold During Half Year. | In Store June 30, 1914. |
|---|---|---|---|---|---|
| Coke—tons | 16,030 | 58,699 | 6,887 | 51,231 | 16,611 |
| Breeze—tons. | 4,127 | 7,372 | .. | 6,701 | 4,798 |
| Tar—gallons | 323,636 | 1,179,260 | .. | 1,230,609 | 272,287 |
| Ammoniacal liquor—butts of 108 gallons | 9,751 | 33,870 | 30,687 | .. | 12,934 |
| Sulphate of ammonia—tons | 130 | 1,004 | .. | 1,054 | 80 |

*Statement of Gas Made, Sold, &c.*

| Quantity Made. | Quantity Sold. | | Quantity Accounted for. | Number of Public Lights. |
|---|---|---|---|---|
| | Public Lights and under Contracts (estimated). | Private Lights, per Meter. | | |
| Thousands. | Thousands. | Thousands. | Thousands. | |
| 1,871,768 | 36,567 | 1,677,284 | 1,741,928 | 3,842 |

The last statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows: Coal, oil, &c., £30,055; coke and breeze, £9584; tar, ammoniacal liquor, sulphate of ammonia, &c., £8620; sundry stores, £34,912—total, £83,171. The figures this time last year were: Coal, oil, &c., £26,715; coke and breeze, £5344; tar, ammoniacal liquor, sulphate of ammonia, &c., £9432; sundry stores, £33,733—total, £75,224.

The following is the revenue account:—

*Expenditure.*

| | | | |
|---|---|---|---|
| Manufacture of gas— | | | |
| Coal and oil, including dues, carriage, unloading, and trimming | £109,479 8 1 | | |
| Salaries of Engineer and officers at works | 3,109 4 1 | | |
| Wages (carbonizing) | 10,208 4 11 | | |
| Purification, including labour | 1,547 5 0 | | |
| Repair and maintenance of works and plant, materials and labour (less £389 7s. received for old materials) | 24,991 12 7 | | |
| | | £149,335 14 8 | |
| Profit sharing | | 3,645 7 10 | |
| Distribution of gas— | | | |
| Salaries and wages of officers (including rental clerks) | £5,995 3 6 | | |
| Repair, maintenance, and renewal of mains and services, material and labour | 9,201 9 10 | | |
| Repair and renewal of meters | 3,360 12 0 | | |
| " " " " stoves | 12,128 19 1 | | |
| " " " " prepayment meters and fittings | 11,518 10 3 | | |
| Maintenance of mantles and fittings | 938 9 5 | | |
| | | 43,143 4 1 | |
| Public lamps—lighting and repairing | | 3,133 8 10 | |
| Rent, rates, and taxes | | 17,252 13 5 | |
| Management— | | | |
| Directors' allowance | £1,250 0 0 | | |
| Company's Auditors | 75 0 0 | | |
| Salaries of Secretary, Accountant, and clerks | 963 15 9 | | |
| Collectors' salaries and commission | 1,634 1 2 | | |
| Prepayment meter collection | 3,355 8 10 | | |
| Stationery and printing | 1,121 6 6 | | |
| General charges | 2,068 19 9 | | |
| | | 10,568 12 0 | |
| Bad debts | | 374 1 9 | |
| Law and parliamentary charges | | 425 3 5 | |
| Superannuations and allowances and Workmen's Benefit Society, &c. | | 2,368 2 10 | |
| Official officers, &c. | | 138 17 4 | |
| National Health and Unemployment Insurance | | 551 11 6 | |
| Total expenditure | | £230,936 17 8 | |
| Balance carried to net revenue account | | 50,426 14 2 | |
| | | £281,363 11 10 | |

*Receipts.*

| | | | |
|---|---|---|---|
| Sale of gas— | | | |
| Per meter (number in use, 113,118) at 2s. 4d. per 1000 cubic feet | £195,459 1 2 | | |
| Public lighting and under contracts | 5,597 1 9 | | |
| | £201,056 2 11 | | |
| Less discounts and allowances | 5,186 0 9 | | |
| | | £195,870 2 2 | |
| Rental— | | | |
| Meters (24,011) | £2,882 16 4 | | |
| Stoves (75,707) | 12,137 11 6 | | |
| Prepayment meters and fittings (88,405) | 17,250 16 6 | | |
| Maintenance of mantles and fittings | 824 5 11 | | |
| | | 33,095 10 3 | |
| Residual products— | | | |
| Coke, less £3717 6s. 7d. or labour | £29,338 11 6 | | |
| Breeze, less £752 15s. 3d. for labour | 1,206 5 2 | | |
| Tar | 10,721 5 10 | | |
| Ammoniacal liquor and sulphate of ammonia | 11,758 6 1 | | |
| | | 52,327 9 5 | |
| Miscellaneous receipts— | | | |
| Rent receivable | £28 5 0 | | |
| Transfer fees | 42 5 0 | | |
| | | 70 10 0 | |
| Total receipts | | £281,363 11 10 | |

## Irish Association of Gas Managers.

The Hon. Secretary of the Association (Mr. George Airth, of Dundalk) has issued a strong programme for the annual meeting to be held in Dublin next Tuesday, under the presidency of Mr. P. J. Fitzpatrick, of Maryborough. After a reception by the Lord Mayor and the Inaugural Address of the President, four papers will be submitted: 1. "A Year's Experience of High-Pressure Lighting at Inchicore," by Mr. C. B. Outon. 2. "Efficient Street Lighting, and the Equipment of a Lighting Department," by Mr. Malcolm Littlejohn, M.A. 3. "The New Gas for Small Works Practice," by Mr. C. B. Tully. 4. "Gas Experiences in Australia," by Mr. H. M'Elwee, of Athy. The President has invited the members and their lady friends to luncheon at the Dolphin Hotel; and the annual dinner will take place at the Gresham Hotel at 7 p.m. On the following day there will be a motor charabancs excursion to Glendalough, returning *vid* Bray.

In the paragraph in the last number of the "JOURNAL" referring to the South Metropolitan Company's dividend, the position of the Company at the close of the half year ended June, 1913, was not correctly stated. The £1206 referred to was the surplus on the period named.

The widow and sons of the late Mr. Thomas Thorp have presented to the Stand Grammar School the deceased gentleman's refracting telescope. It is intended to erect a school observatory, and Mr. Thorp's instrument will prove of considerable value to the scholars.

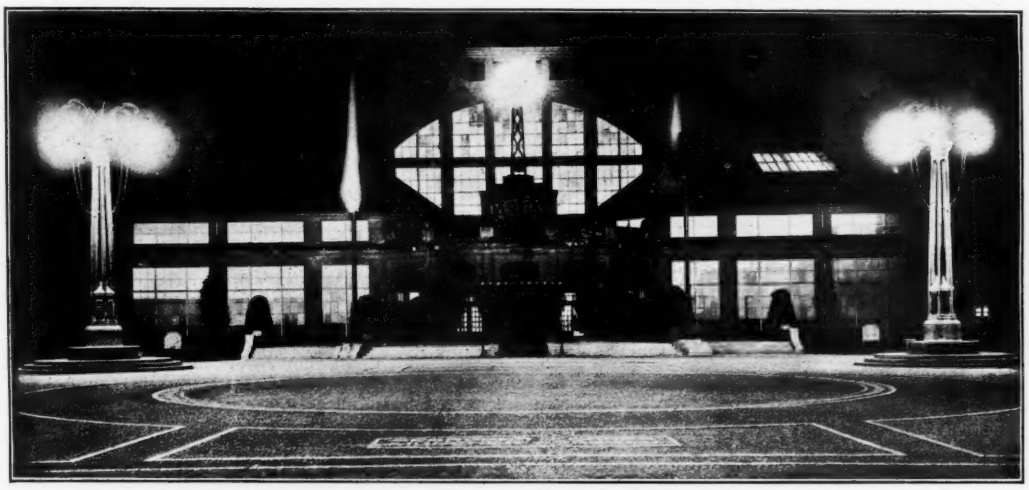
Mr. Robert Jackson Kent, a former Chairman of the Hampton Court Gas Company, who died on the 4th of June at the age of eighty-three, left estate of the gross value of £140,042, with net personalty amounting to £138,569. Among the bequests are £200 each to Mr. W. E. Price, the Engineer and Manager, and Mr. W. C. Lamb, the Secretary, of the Company with which the deceased had been associated. The testator left £500 each to the Free Cancer Hospital and the Middlesex Hospital, in each case to be applied towards the discovery of the cause of cancer, the means of preventing its development, and a cure therefor.

# MORE THOUGHTS FROM MUNICH.

### Impressions of the Exhibition.

THE following critical review of the gas exhibition now taking place in Munich, to which reference has already been made on several occasions in the "JOURNAL," has been sent us by the engineer and manager of a large gas-works in France. Besides giving an excellent idea of the nature of the exhibition, it is interesting as indicating the French impression, which may be compared with the expressions of opinion of Englishmen which have already appeared in our columns.

The exhibition, "Das Gas," which is at present to be seen within the grounds of Theresienhöhe at Munich, may better be described as an exhibition of the German gas industry than as a work of propaganda for increasing the sale of the industry's staple product. There is complete absence of that care to attract and instruct—nay almost to charm—the general public, which was the aim and object at Shepherd's Bush last year. At Munich it is above all to technicians, to gas men, that an appeal is made; it is to them that are shown all the perfection, the resources, and the conquests made by the German gas industry. It must be confessed that this purpose is admirably achieved, and, of its kind, the exhibition is indisputably a great success.



THE LIGHTING OF THE MAIN ENTRANCE TO THE EXHIBITION HALLS.

ILLUMINATION OF THE GROUNDS.

It was organized, not without a large measure of order and method, by a Committee having at its head Herr H. Ries, Manager of the Munich Municipal Gas Undertaking, and Herr K. Lempelius, Chief of the Gas Publicity Centre. It is to these that belongs the lion's share of the credit for success. Spread over six halls, the exhibition occupies a space of 18,000 square metres (more than 4 acres), and at first sight it conveys an impression of great interest and extreme variety. Just and fully deserved admiration can but be felt for the great effort which has been made, the magnificent arrangement of the show, and the variety and importance of the exhibits. Everything that is directly, or for that matter distantly, connected with gas, its production, its distribution, and its application in town, house, or workshop, is included in the collection, and is offered to view in a way that facilitates its study. There are to be seen modern constructional materials, the latest works constructed, the most modern applications of gas for public and private lighting, heating, and cooking, preparation of hot water, the most varied and unexpected industrial uses, gas bye-products and their many applications, the fitting and working of laboratories, the gas man's library—in fact, the whole history of gas during the hundred years of its life is assembled and grouped in the various departments of the exhibition.

In spite of this, a casual stroll through the stands—all grey, black, and white, of sombre aspect, harmonious, but somewhat cold—leaves a feeling of "nothing new," of "seen before." This is no cause for surprise, and by no possible efforts could the organizers have avoided this danger of all modern exhibitions. It is no longer possible to keep inventions in reserve, to hide perfections, and only reveal them on special occasions. Commercial rivalry and competition compel the inventor to disclose his work without delay if he wishes himself to reap the benefit. Technical literature, which becomes more and more abundant, and the close relationship in which the gas industries of different countries stand to one another, soon bring to light every step of progress. As soon as anything new appears, all the world knows it. It is therefore no reproach to say that the exhibition contains nothing which is absolutely new; and besides, in the absence of startling novelties, there is an abundance of matter for study, many improvements, and much that is interesting to gas men, technical and commercial alike.

If the applications of gas for heating are well represented, if, in particular, cooking appliances are more numerous than ever before, it is strange that lighting seems somehow or other to have been sacrificed. There are only three or four interesting exhibits of burners, lamps, and mantles, and fewer still of illumination fittings. And among them there is, with hardly a single exception, nothing that is not already quite well known, no novelty either in principle or in application. This is all the more surprising as Germany is the country which manufactures most burners and most mantles, as questions of photometry and lighting are always very much in evidence, and as inventors and experimenters are particularly numerous and ingenious there. But the big fittings manufacturers of Berlin, Frankfort, and Dresden have chosen to stop away. It is a great pity, as, with their keen competition and their numerous and clever artists, they have turned out work

EXHIBITION INTERIOR—HALL No. 1.

of a new and distinctive type, and of great decorative possibilities. It would have been very interesting indeed to have seen them gathered together, and to have admired, in artistic Munich, this branch of art, in which the gas industry of Germany has specialized.

The German gas industry, of which no better comprehensive idea could have been gathered than at this exhibition, has followed the remarkably rapid development of all the other industries of the country. Besides this, certain peculiar circumstances have favoured the rapid growth—the quick increase of urban populations, growing demand for comfort and even luxury in proportion to the growth of wealth of the people, and, finally, the almost general municipalization of gas-works. To keep pace with the growing demand for gas, the general rule has not been to add to and improve the works, but to reconstruct entirely. In consequence, almost all German towns possess gas-works of recent construction. The result of this has been to give considerable impetus to the affairs of the industry, and to cause the rapid specialization of a number of constructing and manufacturing firms, who now no longer limit their activities to Germany, but cater for export to other countries. Whereas a few years ago almost all constructional work in Spain, Italy, the East, &c., was carried out by English or French firms, the Germans are now to be found constructing or tendering everywhere. For lighting and distribution requirements, in just the same way, the Germans are by far the biggest exporters, and often offer very serious competition to native producers. And all this in spite of the fact that from the first beginnings of the industry, and for many years afterwards, it was the English who were the universal providers for the gas industry, not even Germany excepted.

When faced at Munich with the large number of constructing and manufacturing firms of all sorts connected with the gas industry, and considering the immense amount of capital which must be involved in them, the thought is forced upon one that the day must come when the demand in Germany falls off; then new ground will perforce have to be sought for expansion, and competition will become fiercer than ever. No doubt England and France will not be incapable of defending their interests, with the perfection and solidarity of their work, the good taste of their productions, and the tested capabilities of their engineers. But in contemplation of the methodical ways and the application of the industrial German, his perseverance, his power of organization for production and sale alike, it is impossible not to cast serious thoughts ahead.

ANOTHER OF THE EXHIBITION HALLS.

It must not be forgotten, moreover, that German manufacturers, in the development of their business, receive valuable help from their engineers. It is said that numbers of the latter, not from Germany alone, but from Austria, Belgium, Holland, Italy, and Russia also, flock to Karlsruhe to finish their gas education under the eminent Dr. Karl Bunte. Under him they receive quite a special training, and the influence of German scientific culture, which there grows upon them, is likely to return with them to their native lands, where they will naturally remain favourably disposed to the German industry. Fortunately, however, there are important educational centres for gas men in London and Leeds, the students of which are much appreciated as engineers, not only in the United Kingdom, but abroad also. These no doubt will remain true to the produce of the English gas industry, which has quite rightly become famous, and remains so.

Such are the reflections of our French correspondent, which, he says, are irresistible to the foreigner on his first visit to the magnificent Munich gas exhibition. It gives rise to thought, quite apart from its high technical interest. He has promised, in a future issue, to deal, in more detail, with some of the exhibits.

## QUALITY OF LONDON GAS

### For the Second Quarter of the Year 1914.

We give below, in the customary form, tables summarizing the results of the testings carried out in the testing-places controlled by the London County Council of the gas supplied by the three Metropolitan Companies during the second quarter of this year, and the comparative figures for the corresponding quarters of the two previous years. The period referred to as the second quarter of this year is the thirteen weeks ended June 27.

#### Illuminating Power.

Table I. shows the averages of the results of testings of illuminating power with the standard No. 2 Metropolitan argand burner and with the prescribed flat-flame burner. There is no substantial alteration in the illuminating power of the gas supplied by the Gas Light and Coke and the South Metropolitan Gas Companies as compared with the corresponding quarter of the previous two years. The gas supplied by the Commercial Gas Company shows a perceptible reduction in illuminating power. The lowest return for the argand burner from any of the testing-places for the Gas Light and Coke Company was 13·33 candles; and in one other week of the quarter there was also a return for this Company below 13½ candles. In only one week of the quarter was the minimum return for the Company above 14 candles.

Table I.—*Averages of All the Testings of Illuminating Power for the Second Quarter of the Year* [*Candles*].

| Company. | No. 2 "Metropolitan" Argand. | | | Flat-Flame. | | |
|---|---|---|---|---|---|---|
| | 1912. | 1913. | 1914. | 1912. | 1913. | 1914. |
| Gas Light and Coke. | 14·46 | 14·42 | 14·40 | 8·25 | 8·21 | 7·97 |
| South Metropolitan. | 15·53 | 15·56 | 15·49 | 9·27 | 9·64 | 9·34 |
| Commercial . . . | 15·03 | 14·65 | 14·35 | 8·65 | 8·30 | 7·67 |

The minimum return for the South Metropolitan Gas Company throughout the quarter was 14·01 candles. The minimum return for the Commercial Gas Company was 13·03 candles; and in two other weeks of the quarter this Company had minimum returns slightly below 14 candles. It does not follow that the minimum returns of 13·33 and 13·03 candles for the Gas Light and Coke and the Commercial Companies, respectively, will have rendered either Company liable to incur a forfeiture, since, with returns between 13 and 13½ candles, the results of the preceding and following days' testings are averaged with that of the day on which the deficiency occurred; and if the average of the three days' results is not below 13½ candles the Company are not liable to a forfeiture. The particulars given in the weekly reports issued by the London County Council are not sufficiently full for the average of any three days' testings to be computed from them.

The minimum returns for the flat-flame testings were: For the Gas Light and Coke Company, 5·72 candles; for the South Metropolitan Gas Company, 7·16 candles; and for the Commercial Company 6·64 candles. According to the provisions of the Gas Light and Coke Company's Bill of this year the argand testings with forfeitures in respect of illuminating power will cease to apply to this Company.

#### Calorific Power.

Table II. gives a summary of the results of the testings of calorific power during the second quarter of this year and of the preceding two years.

There is practically no change in the average calorific power of the gas supplied by the Gas Light and Coke Company; a small reduction in that of the gas supplied by the South Metropolitan Gas Company; and a rather greater reduction in the Commercial Gas Company's supply. The minimum net calorific power for the Gas Light and Coke Company is above the average of 112½ calories to which the Company are required to work, on the mean of three consecutive days' testings, by their Act of 1909. The Commercial Gas Company, who are under no statutory obligations in respect of calorific power, had results below 112½ calories in three weeks of the past quarter; while the South Metropolitan Company, who likewise are under no obligation in respect of calorific power had a minimum return for the quarter of 118·3 calories net. The minimum gross return for the Gas Light and Coke Company—viz., 126·1 calories—is equivalent to 500·4 B.Th.U., which is above the standard of 499½ B.Th.U. gross prescribed in the Company's Bill of this year.

Table II.—*Summary of Testings of Calorific Power (Gross and Net) for the Second Quarter of the Year* [*Calories per Cubic Foot*].

| Company. | Average. | | | Maximum. | | | Minimum. | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1912. | 1913. | 1914. | 1912. | 1913. | 1914. | 1912. | 1913. | 1914. |
| Gas Light and Coke— | | | | | | | | | |
| Gross . . . . | 134·4 | 135·9 | 134·7 | 145·4 | 145·4 | 148·0 | 123·7 | 126·6 | 126·1 |
| Net . . . . . | 119·9 | 121·0 | 120·3 | 130·4 | 130·0 | 131·7 | 112·6 | 113·3 | 114·3 |
| South Metropolitan— | | | | | | | | | |
| Gross . . . . | 142·9 | 143·7 | 141·5 | 154·3 | 156·4 | 151·9 | 132·7 | 134·7 | 135·2 |
| Net . . . . . | 127·3 | 128·0 | 125·7 | 137·5 | 139·8 | 135·2 | 118·2 | 119·2 | 118·3 |
| Commercial— | | | | | | | | | |
| Gross . . . . | 136·0 | 135·0 | 133·4 | 147·9 | 145·8 | 146·0 | 123·8 | 124·7 | 120·8 |
| Net . . . . . | 122·0 | 120·7 | 119·6 | 134·6 | 131·0 | 132·0 | 119·0 | 112·4 | 108·7 |

#### Sulphur.

Table III. gives the average and maximum figures for the sulphur testings during the quarter. The gas supplied by the South Metropolitan Company shows a considerably lower content of sulphur than in the corresponding quarters of the two preceding years, though it is about one grain higher than the Company's average for the first quarter of the year. The sulphur returns for the other two Companies do not call for comment.

Table III.—*Summary of Testings of the Sulphur in London Gas for the Second Quarter of the Year* [*Grains per* 100 *Cubic Feet*].

| Company. | Average. | | | Maximum. | | |
|---|---|---|---|---|---|---|
| | 1912. | 1913. | 1914. | 1912. | 1913. | 1914. |
| Gas Light and Coke. | 34·3 | 38·0 | 32·9 | 52·3 | 62·2 | 55·1 |
| South Metropolitan | 24·1 | 22·9 | 19·0 | 44·8 | 50·3 | 51·1 |
| Commercial . . . | 25·0 | 30·4 | 32·0 | 40·6 | 45·9 | 67·9 |

**Professor Bone's Society of Arts Lectures.**—The current number of the "Journal of the Royal Society of Arts" contains the first of the series of Howard Lectures on "Surface Combustion" delivered by Dr. W. A. Bone, F.R.S., Professor of Chemical Technology at the Imperial College of Science and Technology, early in the year, and noticed in the "Journal" at the time. The other lectures will be given in succeeding issues.

**Aluminium in Gas-Works.**—Printed matter issued by the British Aluminium Company, Limited, of No. 109, Queen Victoria Street, E.C., draws attention to the innumerable purposes to which aluminium may be, and is, applied. In connection with the gas industry, of course, it is useful in many ways. Among other things made by the Company is an overhead aluminium network feeder, which they point out has a good field among telpher and similar installations in gas-works. The property which the metal enjoys, of withstanding the corrosive action of sulphur and ammonia fumes, renders it particularly suitable for sheeting, &c., on different parts of gas-works; while for lamp tops and bodies its advantages have on several occasions already been pointed out in our pages.

**Kelvin Memorial Fund.**—We learn from Dr. J. H. T. Tudsbery, the Hon. Secretary and Treasurer of this fund, that the total sum received to its credit has amounted to £1704, of which the expenses in connection with the provision of the memorial window in Westminster Abbey absorbed £1223; leaving a balance of £481. The Executive Committee recommend that this sum should be applied to the establishment of a Kelvin Gold Medal, "to be awarded triennially as a mark of distinction in engineering work or investigation of the kinds with which Lord Kelvin was especially identified." The Institution of Civil Engineers are to be requested to accept the trust and administration of the medal fund; and the award is to be dealt with by a Committee which will include the Presidents of the Institutions of Civil, Mechanical, and Electrical Engineers, the Iron and Steel Institute, and other institutions. They will make the first award in the spring of next year, after considering recommendations to be invited from the leading engineering societies in all parts of the world.

# ELECTRICITY SUPPLY MEMORANDA.

WEEK by week, month by month, and year by year, the electrical papers have published descriptions of appliances connected with the use of electrical energy—domestically and industrially. Most of these things have had their virtues journalistically applauded, a few advertisements have appeared, and then in greater part they have been added to the mighty moraine formed by things that have come and gone, with only brief existence between, and no real utility by which to remember them. The history of these things would make a fat book, illustrating wasted effort, and the process of rapid sinking into oblivion. Mr. C. H. Wordingham—an old friend of ours, who wanted once, with the utmost good nature, to parcel out to the gas and electrical industries their proper spheres of usefulness—thinks (we find from a published statement of his) the time has come when there should be an electrical proving-house, so that types—not individual productions—might be tested under proper authority and rules, be certified, and be presented to the public as things that merit their approbation and patronage, without any fear of them disgracing themselves beyond the normal difficulties interent to all electricity supply. His chief object is to set and to ensure a high standard of design and manufacture, and so give a certain amount of assurance, and guard as far as possible against disappointment. There is merit in Mr. Wordingham's aspirations. But some of his critics see in this high standard and the testing, additional costs, which they think electrical appliances cannot bear, and which therefore will put a spoke in the wheel of progress of the electrical industry. Mr. Wordingham can afford to ignore such short-sightedness. His scheme, whether feasible or not, has at least for its support an intention of permanent progress; the installation of cheap inferior appliances in houses is a most potent means of hindering progress by producing dissatisfaction. He wants a prescribed excellence; his critics do not. The point as to not testing individually, is dismissed by him as impracticable on the score of the large staff and heavy expense that would be involved. "Such a detailed inspection, if it is not to be far worse than useless (as it would be if it engendered a false sense of security) must be carried out on the lines of Government overseeing." We like the expression "a false sense of security," which indicates that, in Mr. Wordingham's opinion, users, even if there were individual inspection and certification, must not indulge the hope of a positive security. At the same time, he would not have the proposed proving-house conducted on too narrow lines. He also recognizes the fire hazard of electrical operation, when saying that he does not think the scope of the suggested institution "should by any means be confined to looking after apparatus from the fire hazard point of view only." He would have a governing body drawn from all interested bodies; and an executive committee upon which, among others, the Fire Offices should be represented. He would have a technically paid director, upon whose recommendation certificates should be issued. The proving-house would have to be subsidized until, if ever, the fees made it self-supporting. We anticipate having to wait a long time before all concerned see their way to voting unanimously for the establishment of the scheme.

**A Central Proving House.**

Our electrical contemporaries do not quite know whether or not to welcome with open arms the reduced prices of the sight-impairing and incorrectly named half-watt lamps, and the lower units, albeit these must be run in series, or with the intervention of a transformer, which will further affect the candle per half watt claim. So they have favoured the middle course as being the safest. They do not want to offend the manufacturers, for they are kindly disposed souls with their competing advertisements; but, on the other hand, they do not wish to let the electricity supply industry think they are unduly bolstering up means of depriving it of part of its most remunerative revenue. Therefore, the manufacturers are urged to go slowly; and the electricity supply industry is asked to remember that, though the lamps may be here, people are not going to jump at them at once, but conversion will be the process of years, and the fact that the use of the lower units (the lowest being of 200-candle power at a pressure of 50-65 volts) involves series running, or the aid of a transformer, is rather a good thing in putting the brake on adoption. The reductions that have been made of 5s. and 10s. in the prices of the high-power units were sorely wanted to give them a better footing in the competition with arc lamps, combined with the fact that the efficiency is more like 1 candle per 0·75 watt than 1 candle per 0·5 watt. To have to pay 35s., 50s., or 60s. for lamps to which, respectively, candle powers of 1000, 2000, or 3000 were attributed, and then to have a filament collapse before or immediately after installation, was no joke, or, at all events, users could not see that it was. To have to pay prices only 5s. or 10s. less, and then have the same experience, is no laughing matter. The smallest unit that can be employed on voltages of 200 to 255 is a reputed 1000-candle power one. On voltages of 100 to 130, 400 and 600 candle power lamps, as well as the higher power units, can be used; and on 50 to 65 volt circuits 200, 400, 600, and 1000 candle power units can be run. What it comes to is this: The smaller units have been obtained not by any new invention or discovery, but simply by a little divisional work on ordinary pressures. As to running costs, it will be easy to approximately calculate them out. Multiply the candle power by 0·75 watt or thereabouts, and there one has the consumption of current. Take into the reckoning the price of the new lamps [see the table given on p. 217 last week], and make a liberal calculation for maintenance and renewals, for if there is one considerable piece of uncertainty about these lamps, it is their life. The ascribed life is 800 hours; but this is for those lamps that are fortunate. The figures derived from the calculation will be for the bare lamp; but as the intrinsic brilliancy compels the degrading of the efficiency named by enclosing the lamp in an eye-protecting envelope (unless the user is absolutely callous as to the ill-effects of such lamps), the cost in relation to candle power ascends. However, the makers anticipate big things from the smaller units; for they say they hold "enormous" stocks to meet the demand.

**"Half-Watt" Price Reductions.**

Some tests have cast doubts on the permanence of the first efficiency of the new lamps; and one cause of this (when the filaments hold together, and give the lamps a run for the money they cost) is disintegration of the filaments. "Electrical Engineering" calls attention to a small treatise on the "Nitra" lamp by Dr. K. Mey. In this, after stating that the limit of efficiency of the tungsten lamp should be 1 candle per 0·2 watt, when the temperature of the filament would reach 2900° C.—the melting-point of the metal—the author points out that the obstacle to attaining a temperature approaching this is the disintegration of the filament. This disintegration is not due to any electrical cause, but purely to the volatilization or flying-off of the rapidly oscillating tungsten molecules. Filling the globe with an inert gas to prevent this volatilization was tried years ago without success in the case of carbon filament lamps; and it was at first not expected that it would give any better result with tungsten filaments. It was not successful with the ordinary straight filaments, as the energy lost by conduction and convection counteracted the gain in efficiency due to the high temperature of the filament; but by winding the filament into a spiral, and by confining it to a small space, with a small surface exposed to the gas, the heat transference was reduced sufficiently to make the introduction of the gas worth while. There is still a certain amount of disintegration; and this, of course, affects the low candle-power lamps with filaments of only 1/50 mm. diameter to a much greater degree than the high-candle-power lamps with filaments of 1/3 mm., as the disintegrated layer in a given period is a much larger proportion of the whole in the former case. The lamps are filled with nitrogen at a pressure of about two-thirds of an atmosphere, in order that the pressure shall not be great enough when hot to burst the globe.

**Disintegration of Filaments.**

Makers of electric cooking appliances are producing a new form of oven, in which, so it is claimed, the greater part of the cooking is accomplished by stored heat, which is preserved and safeguarded by the form of construction. The ovens are not large; and they are chubby looking things, something like small office safes. There is the "Marvel" and the "El Cooko" as samples of the new forms. They are called "fireless cookers," and are importations from America. The "Marvel" has an oven space of 15 in. by 9½ in. by 10½ in., two 8-inch boiling-discs, and a 9-inch three-tier steamer. Externally, the oven is constructed of strong sheet steel; then comes 2½ inches of insulating material; and the lining is of aluminium. The door is similarly constructed. The oven heating elements are rated at about 3000 watts. In operating the oven, the procedure is this: For about 20 minutes, the current is switched on, then the oven-door is opened, and the joint and other articles are placed inside. The door is then closed, and the current is kept on for a further ten or fifteen minutes, until the necessary temperature has been reached. No further consumplion, it is said, is needed; the stored heat being then sufficient for any food for which there is space. The makers state that the loss of weight of meat during cooking is under 1 oz. per lb. The "El Cooko" is similarly constructed—planished steel, heavy lagging, and an inner lining of aluminium. In this case the oven is 9½ in. by 10 in. by 12 in. The food is cooked in deep aluminium pans, almost fitting the spaces between the bottom and the division tray and the tray and the top. This oven is under thermostatic control; and when the required heat has been reached, the current is switched-off. The cooking, it is said, is carried out with the stored heat at a surprisingly small consumption of energy. An instance is quoted. A meal was cooked consisting of 3 lbs. of beef, potatoes for three persons, dried fruit pudding, and quarter peck of peas. This was a small tax on the oven. The meat and potatoes were placed in the cold oven at 10.8 a.m., and the current was switched on. At 10.48, the thermostat broke the circuit; and no further current was used. At 10.36 the pudding was put in; and the peas at 11.45. At 1.30, the food was taken out and served—3 hours and 22 minutes from the beginning of the cooking of this modest meal. For three hours and 22 minutes the 3 lbs. of meat and the potatoes had been cooking, and the peas for 1¾ hours—instead of about a quarter of an hour per pound of meat, and a single quarter of an hour for the peas. This looks like playing at cooking. It is a pity there is any loss of heat at all, because then the one heating up might, with care, last for ever, with occasional

**Ovens and Stored Heat.**

supplementing for the loss when the oven-door was opened for putting in or removing the viands.

**The Ferranti Water-Heater.**

Some time ago, allusion was made in the "Memoranda" to the Ferranti water-heater. The heater is still being advertised; but there is no news from any part of the country of people pouring their orders into the hands of contractors for the installation of this wonderful piece of apparatus. For wonderful it is claimed to be, being electrical. It is asserted that it "will give a 'constant' supply of hot water, available at any time of the day or night, for all the usual requirements of the household, at a small cost for current." It is also stated that it can be substituted for, or used in conjunction with, the existing hot-water system. Let us see what happens, assuming that every B.Th.U. put into the heater does the useful work of a full B.Th.U., and that there is not a fraction of the heat lost in any of the ordinary ways. The heater is made in five sizes—Nos. 1 and 2 having a cistern capacity of 23 gallons, and taking respectively 350 and 500 watts per hour. Nos. 3, 4, and 5 have a cistern capacity of 34 gallons, and take respectively 350, 500, and 750 watts per hour. Now 23 gallons is none too much water for a bath. Supposing one starts all cold, with water having an initial temperature of 50° Fahr., and water is required at 120°. Energy is being delivered at 350 watts per hour. This would mean—assuming the miraculous condition that there was not the slightest loss of heat during the period taken to raise the 230 lbs. of water 70° Fahr.—that nearly 5 units of electricity would be consumed, and fourteen hours absorbed in the operation! On the same lines, if 23 gallons of boiling water were required, 7·5 units of electricity would be used; and the realization of this quantity of boiling water would mean 21 hours. We can understand household "constancy" of supply when only small quantities of water are needed; but we cannot understand the use of the expression by Ferranti Limited under the diverse requirements of a household when some mornings several baths are required, or when the washing of household linen or scrubbing operations are in progress, and boiling water is needed in bulk. Under these diverse conditions, the claim of "small cost" does not satisfy us. Inconvenience and cost scoff at electrical efforts in this direction.

**The Art of Evasion.**

"Meteor" of the "Electrical Times" has found our recent leader on the annual report of the Chief Inspector of Factories and Workshops very amusing; and we have had a hearty laugh over his loosely spun references, and obvious evasion, which are intended to simultaneously point the moral of the report and subvert our comments. It does neither the one thing nor the other. The truth is "Meteor" is afraid to deal, as we did, with the contradictions of the factory inspectors. He finds it judicious to pick out the remark of one lady inspector anent flat-flame gas-burners, and their supposed effect on the eyes of the workers. The intrinsic brilliancy of this form of lighting compared with that of the metallic filament order has no claim upon the attention of "Meteor." In constructing a case a feature of which is electric evasion, it would, of course, be highly ridiculous to refer to it. He overlooks the point made by another lady inspector as to the makeshift screening by workers of metallic filament lamps, and of the expensiveness in factory lighting of the indirect electric system. "Meteor's" knowledge of the subject of the danger rays of electric lamps is presented by a double reference to the "ultra" red rays, when the invisible infra-red rays were arraigned as the culprits. He conveniently avoids all else in our article; and there we have illustrated "Meteor's" notions of useful, fair, and judicious comment. It is poor stuff when he gets on to the track of trying to belittle by exercising the arts of evasion and satire. In the studied evasion of the truth, there is superlative meanness, which is accentuated by the satire.

**Provisional Orders.**

It is rather a bald report the Board of Trade have made on the session's applications for Provisional Orders for electric supply. The new schemes, generally speaking, were of the "small fry" order, and most of the others were merely extensions of existing powers or undertakings. The applications numbered 51. The Board granted 43; and they put 8 out of existence. In the latter was that promoted by the Ely Gas Company; but one that was granted (this was an extension Order) was that of the Farnham Company. The Lurgan Order was opposed by the local Gas Company, who simultaneously had a Bill in Parliament. The Board granted the Order of the District Council. Altogether, eleven Orders have been transferred during the year—ten to companies, and only one to a local authority. Since 1893, 1497 Orders have been applied for, 1199 have been made by the Board, and 1180 have been confirmed by Parliament. But 367 of these have not developed, and so are no longer in force—no doubt to the great advantage of the areas the promoters originally intended to serve.

## NATIONAL ILLUMINATION COMMITTEES.

It was stated in the course of the last report of the Council of the Institution of Gas Engineers, in connection with the International Commission on Illumination, that delegates were appointed to it by a National Committee in each country, and that an Illumination Committee for Great Britain had accordingly been formed by collaboration between the Institution of Gas Engineers, the Institution of Electrical Engineers, the Illuminating Engineering Society, and the National Physical Laboratory. The representatives of the Institution of Gas Engineers on the Committee were then named, as follows: Mr. Edward Allen, Mr. John Bond, Mr. W. J. A. Butterfield, Dr. H. G. Colman, and Mr. Robert Watson. The Committee have appointed Dr. Colman and Mr. W. Duddell representatives of Great Britain on the Executive Committee of the International Commission. Mr. Allen is the Chairman of the Illumination Committee of Great Britain, and Mr. Butterfield the Secretary and Treasurer. A set of rules have now been drafted up; and there has been sent us a copy, to which reference is made in an editorial article in this issue.

We are also informed by the Secretary *pro tem.* (de Heer Ternedin) that the following gentlemen have been selected to form the National Committee for Holland: de Heer J. van Rossum du Chattel, Director of the Amsterdam Municipal Gas-Works (President, and delegate to the Executive Committee of the International Commission); Dr. W. Lulofs, Director of the Amsterdam Municipal Electricity Works (Secretary and delegate to the Executive Committee); de Heer G. A. Brender à Brandis, Engineer, Municipal Gas-Works, The Hague; Professor C. Feldmann and Professor M. de Haas, Technical University, Delft; de Heer W. Niermeyer, Director of the Municipal Gas-Works, Arnhem; Mr. G. A. F. Phillips, electric lamp manufacturer, Eindhoven; Professor G. J. van Swaay, Technical University, Delft; Dr. L. J. Terneden, Engineer, Municipal Gas-Works, Amsterdam; and de Heer E. F. van de Waereld, Chemist, Municipal Gas-Works, Utrecht.

## NEXT YEAR'S CITY AND GUILDS EXAMINATIONS.

We have received from the Superintendent of the Department of Technology of the City and Guilds of London (Sir Philip Magnus, M.P.) the programme for the session 1914-15. It contains full information in regard to the examinations in which the younger readers of the "Journal" are interested, including, as usual, a list of the works of reference which candidates are advised to consult when prosecuting their studies. In addition to "Gas Engineering" and "Gas Supply," an examination will next year be held in "Gas-Fitting;" the Examiners in which are Mr. H. Kendrick and Mr. R. Halkett. The course is intended to cover at least three years, and there will be three examinations, which may be taken at the end of each year's instruction. In Grade I., candidates will be examined on the elements of gas-fitter's work and the principles governing gas supply; but no certificate will be awarded on the results. The examination in Grade II. and the Final Examination will each consist of two parts—a practical test of workmanship, and a written examination on the theory and principles of the subject. To obtain a certificate in "Gas-Fitting," the candidate must pass both parts of the examination; and only those who have passed the practical will be eligible to sit for the written examination. All apprentices are strongly recommended to attend a two years' course of instruction in elementary science, geometry, and workshop drawings and calculations before attending a course in "Gas-Fitting." The examination in this subject will take place on Monday, the 26th of April, from 7 p.m. to 10 p.m. The Examiners in "Gas Engineering" and "Gas Supply" will be Mr. Samuel Glover (who has succeeded his brother) and Mr. W. Hole; and their papers will be submitted to the candidates on the 24th of April and the 1st of May respectively—the examination lasting from 2.30 p.m. to 6.30 p.m. In addition to the above-named subjects, examinations will, as hitherto, be held in "Coal-Tar Distillation and Intermediate Products," "Coal-Tar Colouring Matters," "Structural Engineering," and "Heating and Ventilating Engineering."

The programme contains lists of scholarships, exhibitions, and money prizes offered by the City Livery Companies, the money prizes given by the Institute, and the persons registered as qualified teachers in technology. In "Gas Engineering" and "Gas Supply," the Society of British Gas Industries offer prizes of £3 3s. and £2 2s. to the first and second candidates respectively at the Final Examination in each subject, provided they are eligible under one of the rules specified.

Copies of the programme may be had from the Publisher, Mr. John Murray, Albemarle Street, W., price 9d. net (postage extra).

The Hon. Secretary and Treasurer (Mr. David Fulton, of the Helensburgh Gas-Works) has forwarded a copy of the "Transactions" of the Scottish Junior Gas Association (Western District) for the session 1913-14. The matter contained in the volume (which is reprinted from the "Journal" pages) constitutes a record of useful work.

In the report of the proceedings in the case of *Brame and Clark v. Commercial Gas Company*, in the last number of the "Journal," and the editorial comments thereon, the Act under which borough councils are authorized to reinstate pavements and charge gas companies with the cost should have been cited as the Metropolis Management Act, 1855 (not 1895).

## MODEL KITCHEN FOR THE PANAMA-PACIFIC EXPOSITION.

To the average visitor to the Panama-Pacific International Exposition, the Palace of Manufactures will unquestionably prove the most interesting of the buildings, as the exhibits comprise almost every article that men and women come into daily contact with, and which are intimately related to their homes and business lives. Entering the palace from the South Gardens, the first exhibit which will greet the eye will be the model kitchen designed and operated by Mrs. Edith M. Jones, of Minneapolis, the recognized authority on kitchen architecture in the United States.

The kitchen will be divided into two sections, one of which will be a gas kitchen and the other an electrical one. The most modern appliances will be used in both, and food will be prepared before the eyes of the visitors. Surrounding the two kitchens will be rows of booths in which will be exhibited the individual displays of the best-known manufacturers of kitchen utensils.

Mrs. Jones, who will personally supervise the work of the kitchen, and who will explain the various utensils, is a woman of broad interests and education, and is devoting her time and experience to the effort of making the work of women easier, and lifting the activities of the kitchen above the thought of drudgery and discontent to the dignity and art of true home making. "The kitchen is the most important part of the home," said Mrs. Jones in a recent interview. "Ever since Benjamin Franklin invented the cooking-stove, it has been evolving itself under the influence of the great needs of the time, until the beautiful white enamel gas-ranges of to-day have come as a blessing to every kitchen, doing away with the dirt and hard work, and helping to make the precious minutes count for more than of old. The kitchen of the future is going to be more and more like the operating-room of a hospital. Nothing unnecessary will be there, and every part of the equipment will be chosen from the highest sanitary requirements. In fact, aside from the individual treatment of each kitchen, nothing is more significant than the use of metal equipment. It is not only dust and vermin proof, but durable and easily kept clean. The hotel-type kitchen which I planned and installed for the Minneapolis Gas Light Company is used in the 'Welfare Work' which is carried on by the Company in caring for their employees. It is furnished with white enamel refrigerators, white enamel ranges, cabinets of metal, with vitrulite doors, white marble serving counters and pastry slabs, tables with metal legs, metal shelves, and bins, grey tile floor, white tile side-walls, artesian water for cooking, electric dish-washer, and gas-warming ovens—in fact, everything to help in the important service it performs. It is, indeed, a laboratory of spotless appearance, and is a most satisfactory type of equipment from every standpoint."

## GAS-WORKS' MANAGEMENT IN GERMANY.*

Dr. Greineder has prepared a very interesting and instructive memoir of the gas exhibition at Munich. A well-known writer and authority on all matters relating to the financial administration of public service undertakings, and of gas-works in particular, he treats the subject of the economics of gas-works' management in Germany with a fulness of knowledge and a facility of exposition which makes his memoir both useful as a work of reference and attractive as the story of the progress of a great industry.

The memoir is in four chapters. In the first chapter, Dr. Greineder describes the development of the German gas industry and emphasizes the important position held by gas in the supply of light, power, and heat. Starting with the opening of gas-works in Hanover and Berlin by the Imperial Continental Gas Association in 1826, gas supply at first advanced slowly in Germany; and in 1850 there were only 35 towns in the country provided with gas-works. Thenceforward, however, the progress was rapid; and at the beginning of last year there were about 1700 gas-works, having an aggregate production of about 96,500 million cubic feet of gas per annum. In recent years the output has increased, year by year, by from 5·47 to 7·33 per cent.

In regard to the important position held by gas in public lighting, it is pointed out that, whereas 62½ miles of main thoroughfares in Berlin are now lighted by high-pressure gas-lamps, only 17½ miles are lighted by electric arc lamps. Incidentally, the author discusses the bearing of the half-watt lamp on public and private lighting. This lamp, which is at present produced in large sizes for 110 or 220 volt circuits, and in a few smaller sizes which must be coupled in series in each circuit, has a duty of 0·5 watt per Hefner or 0·55 watt per candle. It must not be forgotten that its use in dwelling rooms would be a retrograde step from the hygienic standpoint, on account of its brilliancy and resultant glare. Against the increased duty of the so-called half-watt lamp, the gas industry can point to the increased duty of the new Killing's "Mundus" inverted lamp, which works out at 37 candles per cubic foot of gas consumed.

The second chapter deals with statistics of German gas undertakings for the year 1912-13—especially by reference to a scale model of gas-works operations which is in the gas exhibition at Munich. This model shows, *inter alia*, that the average yield of products, in percentages by weight, per ton of coal carbonized in German gas-works, was in 1912-13: Gas, 17·5; coke, 65·0 (coke sold = 56·0); tar, 5; liquor, 12·42 (= 0·9 of ammonium sulphate); cyanogen, 0·02; and retort-carbon, 0·06. Of the total receipts for these products, the sale of gas was responsible for 76·5 per cent.; coke, 17·5; tar, 2·5; ammonia, 3·2; cyanogen, 0·26; and retort-carbon, 0·06 per cent. Thus all the bye-products only account for 23·5 per cent. of the total receipts. If depreciation is taken at 3 per cent. of the capital expenditure, the average gross profit of German gas-works would be 14·24 per cent. per annum on the capital expended, or 23·64 per cent. on the present book value of the undertakings. For the purpose of comparison of working charges, &c., per cubic metre of gas sold, and per head of the population, the author ranges the German gas-works in five groups according to their output. For the larger undertakings, the net prime cost of gas averages 1s. 8·16d. per 1000 cubic feet of gas sold; the interest and depreciation charges average 10·16d.; and the net profit, 1s. 4·63d.

The third chapter deals with requirements in the future in the administration of gas-works. In Germany 67 per cent. of the gas-works, responsible for 82 per cent. of the total output of gas, are owned by public authorities; and the high return required by them in relation to the capital invested is regarded by the author as a serious obstacle to the wider adoption of gas. The return, including interest, is equivalent to 18·66 per cent. on the book value of the undertakings; and the corresponding figure for German electricity works is only 5·7 per cent. The advantage to the public of supplies of energy at the lowest possible rates is so evident that this unequal treatment of gas and electricity undertakings must be rectified in the near future by the authorities working their gas undertakings upon strictly business lines, and demanding of them only a proper return on the capital invested in them. This change should promote an enormous advance in the use of gas, which is the most popular source of energy at the present day. The author considers that the consumption of gas may be greatly increased by the intelligent application of different prices or rates of charge for large and small consumers and for different uses.

The fourth chapter analyses the distribution of gas consumption in Germany. It shows for different towns, the consumption per head of the population, per consumer, and per unit length of main laid. Of the larger towns, Charlottenburg stands foremost with an output of 6570 cubic feet of gas per head, and of 10,866,000 cubic feet per mile of main per annum.

Dr. Greineder has provided a fitting memoir of the great gas exhibition at Munich, and we can commend a study of it to all interested in the gas industry who will not find the German language and money and the metric system of measures an insuperable obstacle to the understanding of it.

* "Die Wirtschaft der Deutschen Gaswerke. Denkschrift anlässlich der Deutschen Ausstellung 'Das Gas,' München, 1914." By Dr.-Ing. Friedrich Greineder. Munich and Berlin, R. Oldenbourg; 1914.

## WATER SUPPLY IN THICKLY-PEOPLED AREAS.

The work by Dr. Adolf Heilmann which has just appeared treats of modern water supply in the thickly populated districts of Germany from both an administrative and a technical standpoint.* The author states that the conception of the work is due to Professor Wilhelm Kähler, of the Technical College at Aix-la-Chapelle. It should prove useful to water engineers, and the secretaries and directors of water undertakings which are confronted with a rapid growth of population in the area of supply—especially if the available gathering ground or possible source of supply is as indifferent from the water engineer's point of view as that of many of the rapidly developing industrial districts of Germany.

Dr. Heilmann in an introductory chapter traces the movements of the population in Germany during the last century, and more particularly since 1871, when 63·9 per cent. of the people were country dwellers or agriculturists. In 1910 this class had fallen to less than 40 per cent. of the population. The large towns of Germany contained in 1871 only 4·9 per cent. of the total; but in 1910 they contained 21·28 per cent. of the population of the Empire. The concentration of population in urban areas which these figures indicate has raised, during the lifetime of the present generation, problems of water supply which did not arise in the earlier years of the German Empire. Exactly what these problems are, and how they have been dealt with in different places, are matters which Dr. Heilmann discusses very fully in the six sections into which his book is divided.

The work concludes with a number of tables which embody detailed particulars and statistics showing the development of population and water supply in 43 large German towns during the period from 1888 to 1910, and two plates—one of which gives a diagrammatic comparison of the financial conditions of the water undertakings in the towns in the year 1910. The book appears to be a careful compilation, containing data of considerable interest to the majority of water engineers.

* "Neuzeitliche Wasserversorgung in Gegenden Starker Bevölkerungsanhäufung in Deutschland." Eine Wirtschaftlich-Technische Untersuchung von Dr.-Ing. A. Heilmann, Regierungsbaumeister. Munich and Berlin, R. Oldenbourg; 1914.

# WHAT GAS CAN DO FOR CINEMA THEATRES.

By H. C. Widlake, M.J.Inst.E., of the Plymouth and Stonehouse Gaslight and Coke Company.

It is an unfortunate fact that the apathy of the great majority of gas undertakings with respect to the possibilities of the electric theatre from the consumption point of view is largely responsible for the undeniable pull which electricity supply undertakings have over us so far as this class of power user is concerned. Electricity supply officials are fully alive to the advantages a good daylight load confers upon them, not only from a commercial, but also from an engineering standpoint; and when it is remembered that the lantern load alone of an average cinema amounts to 5 to 6 kilowatts, it will immediately be seen that, in the average provincial town, these undertakings are responsible for a demand for power and a high daylight load factor the value of which cannot be estimated solely by the charge made for the current metered.

Kinematography has made rapid strides the last few years; and foremost among the many changes that have taken place is the tendency on the part of moving picture exhibitors to lay down their own generating plant. It is in this direction that the mutual nature of the interest of utterly different undertakings becomes apparent. The days in which private generating plants driven by gas-engines could truthfully be described as unreliable have long passed into the mists of antiquity; and the efforts of electric supply authorities to resurrect this long dead bogey, in order to frighten some wide-awake cinema proprietor who dares to give any serious consideration to the question of laying down his own plant, would be ludicrous if they were not pitiful.

Connection to the mains of a public supply authority does not necessarily spell immunity from failure of supply—a lesson which many hundreds of cinema managers have learned by sad experience—and the supply derived from a properly-installed and well-maintained private plant may be regarded as equally, if not more, reliable than that obtained from public mains.

In these days of keen competition, it is simply a suicidal policy to sit down and wait for consumers to ask for a supply. Yet this is precisely what is being done in most places in regard to a particularly desirable class of consumer. When speaking at a recent British Commercial Gas Association conference, a member of the Southern District Association of Gas Engineers expressed the relationship between a gas undertaking and its consumers very aptly—"We are all," he said, "shopkeepers on a large scale." The truth of this assertion cannot be denied; and, as shopkeepers, it behoves us to place our wares before all classes of possible consumers for whom we feel we are in a position to cater. The average cinema proprietor is not a trained engineer, and, in the majority of cases, is entirely in the hands of those who have sufficient initiative to be first in the field with advice when a new show is being fitted out. In securing this class of consumer, the importance of being first in the field cannot be exaggerated. If the proprietor of a picture hall is to be secured as a consumer, he should be approached at a time when the conditions are most favourable for the installation of the generating plant—namely, when his premises are in course of erection. It is quite another matter to approach a man after he has expended the best part of £100 on converting gear, and coolly suggest he should throw his motor generator out and instal a gas-engine and dynamo.

## Cinema Requirements.

The writer does not for a moment suggest that business can only be done in this respect with new theatres, but he strongly emphasizes the fact that if the proprietor of a cinema has had to practically scrap an expensive motor generator in order to lay down a private generating plant, the satisfaction derived from the performance of the latter cannot be so great as would have been the case had he been saved this initial outlay on a motor generator.

When a gas undertaking approaches this class of business for the first time, the officials usually find themselves handicapped by an absence of knowledge concerning the requirements which are peculiar to this class of entertainment; and the author's main purpose in writing this article is to familiarize those who do him the honour of perusing it with these conditions, and then enable them to carry a job of this sort through without coming a cropper over the many technical points that are peculiar to the animated picture industry.

Voluminous technical information vouchsafed by the youthful operators found in so many picture halls should be accepted (if at all) with a large degree of reserve, and no responsibility should be entertained or any estimates submitted unless the proprietors of the cinema are willing to give the gas undertaking facilities to insert a check ammeter or watt meter in the arc and theatre circuits.

The position which the majority of gas undertakings have to face is briefly this: In their districts of supply there are a number of animated picture shows drawing a supply of energy from public electricity supply mains, and, in many cases, paying an exorbitant price for it. The proprietors of these shows are business men, out to make money; and if they can be convinced that it will pay them to instal a private generating plant with town gas as the motive power, they will do it.

## The Load of an Electric Picture Theatre.

The load of a cinema may be divided into two distinct portions, and, for reasons that will presently be revealed, must be dealt with separately:

(*a*) The current required by the bioscope lantern.
(*b*) The current required for supplying the house lighting and the exterior decorative circuits.

## Lantern Load.

If good pictures are to be shown, direct current is indispensable so far as the supply to the lantern is concerned. One hears from time to time of the wonderful results that can be obtained with an alternating current by using some particular grade of carbons, a new type transformer, or a patent lens; but all such stories should be taken with a grain of salt. When working with an alternating current a certain degree of steadiness can admittedly be obtained by careful trimming of the carbons, and, conversely, a direct current arc can be made to flicker abominably by inattention to this point; but it remains an undisputable fact that really decent pictures can only be shown by the use of direct current at the lantern.

The picture seeing public of to-day are not the same public who rushed pell mell and paid high prices to see tenth-rate exhibitions ten years ago. They have developed a high degree of discrimination and a critical taste so far as pictures are concerned; and the modern manager who, for the sake of current enonomy, endeavours to satisfy his patrons with an alternating current projector can only be regarded as being unwise, not to use a stronger expression.

The standard pressure required in the operating box is 70 volts direct current. It is to this pressure and character that the supply from the public mains must be altered for use with the lantern; and this may be accomplished by the following methods:

(1) In the case of an alternating current supply by a motor generator set, consisting of an induction motor worked on the supply main coupled direct on a combination bed-plate to a direct-current dynamo, having an output of from 60 to 70 amperes at a pressure of 70 volts.

(2) In the case of a direct-current supply by a motor generator set consisting of a direct-current motor working on the supply mains, coupled direct on a combination bed-plate to a direct current dynamo having an output of from 60 to 70 amperes at a pressure of 70 volts.

(3) In the case of a direct-current supply, by a bank of resistances in series with the arc, these resistances absorbing the difference between the supply pressure and that at the lantern terminals.

The efficiency of either No. 1 or 2 method is about 68 per cent.—namely, the output of the dynamo is only 68 per cent. of the current actually taken by the motor. The efficiency of No. 3 method, however, varies with the value of the supply pressure; and this method could only bear favourable comparison with No. 2 where the supply pressure is in the neighbourhood of 100 volts.

In some cases it may be found that the theatre lighting circuits are connected to the dynamo side of the motor generator—a practice that is a very profitable one so far as the makers of the machine and the supply authority are concerned. The former supply a machine having a much larger capacity, and costing a great deal more, than is actually necessary; while the supply authority benefit by the current taken by the theatre lighting circuits being about 30 per cent. greater than it should be.

All current converted by a motor generator of this size is dealt with at a loss of 30 per cent.; and the only reason that can be advanced for the practice above referred to is a desire on the part of the electric contracting firm to "make hay while the sun shines." This can only be described as "sharp practice."

It is now usual to employ small 1-12th to 1-8th H.P. motors to run the film through the projectors. When the motors are direct current machines, and the supply is an alternating current one, it is permissible to put these machines (together with perhaps one or two small direct-current motor fans) on the generator circuit. But even in this case it may be remarked that it is a very simple job to so adjust a small direct-current motor of this class as to enable it to operate satisfactorily on an alternating current supply.

In all well-equipped installations emergency gear is provided. Method No. 3 is invariably the emergency supply with which method No. 2 is supplemented; while in the case of an alternating current supply, the emergency arrangements consist of the provision of a static transformer which reduces the supply pressure to the figure required at the lantern terminals.

At this point a great argument may be noted in favour of private generating plants—namely, a private generating plant could be installed to generate current at the pressure required at the lantern terminals, whereas in the case of a public supply the pressure has to be reduced to the figure required at the lantern terminals. If good pictures are to be shown, this can only be accomplished by the installation of an expensive machine (costing, with the switchgear, from £50 to £80), which, in fulfilling its

purpose, wastes more than 30 per cent. of the current taken from the supply mains.

An ammeter on the projector circuit is usually a standard fitting in every decent equipment; but should such a meter not be in circuit, a test-meter should be connected, and a series of maximum readings taken. It will be found that in theatres having an average throw, the lantern current is in the neighbourhood of about 60 amperes, and rises to 70 amperes during the exhibition of a particularly dark film.

As illustrating the foregoing remarks, the author proposes to give three examples—namely:

Case No. 1.—The lantern current is taken from a 70-volt private installation.

Case No. 2.—The lantern current is taken from a 200-volt direct or alternating current supply and stepped-down by means of a motor generator.

Case No. 3.—The lantern current is taken from a 200-volt direct-current supply and stepped-down by means of a bank of resistances.

In each case the lantern demand is assumed to be 60 amperes at 70 volts pressure, and a motor generator to have an efficiency of 68 per cent.

Case No. 1.—$\frac{60 \times 70}{1000} = 4{\cdot}2$ B.T.U. per hour.

Case No. 2.—$\frac{60 \times 70}{1000 \times 68 \text{ per cent.}} = 6{\cdot}2$ B.T.U. per hour.

Case No. 3.—Watts lost at arc . . . $60 \times 70 = 4200$
" " " resistances $60 \times 130 = 7800$

B.T.U. per hour 12

A certain amount of resistance is usually left permanently in circuit with the arc, on which it has a steadying effect, and is termed the steadying or ballast resistance. This resistance absorbs from 10 to 15 per cent. of the total voltage, and must not be confused with the striking-up resistance—a number of lightly wound coils which are switched into circuit at the moment of striking-up the arc, so as to reduce the momentary short-circuit current to a safe value (say, to about 40 per cent. of the working amperage) until the arc is properly established.

Some kinematograph engineers hold the opinion that it is preferable to have a 100 volts supply in the operating room, and to break-down to the pressure required at the lantern terminals by means of a heavy ballast resistance. Advocates of this practice claim that the value of the ballast resistance gives a steadier arc, and, as a consequence, better pictures. This is a point that must be decided by the proprietors of the show. It should, however, be pointed out that, in the case of most ordinary provincial shows, this practice means that a plant must be installed having a capacity of 2 kilowatts more than would be the case if a supply of 70 volts were given in the operating room; thus involving an increased capital expenditure, in addition to which 2 units of electricity per hour are being continuously dissipated on the resistances. It is certainly a debatable question whether any advantage is actually gained at the arc, and, if so, whether such advantage is sufficient to justify the increased capital outlay and the continuous extra running costs.

### Illumination Load.

The illumination load will vary considerably with different theatres. It may be observed that in the district supplied by the Plymouth and Stonehouse Gaslight and Coke Company, with which the writer is associated, there are theatres in which the illumination load greatly exceeds the lantern load. Considerable care should be taken in determining this load. A meter should

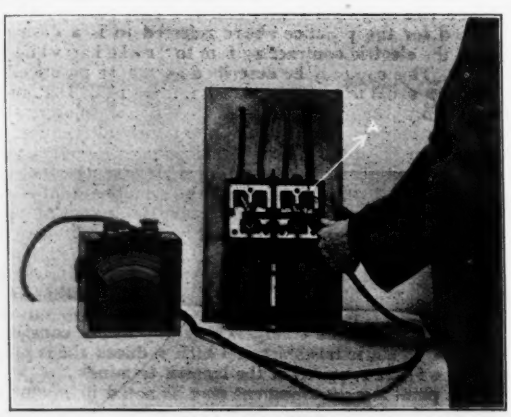


Fig. 1.—Test Meter.

be placed in each main circuit, and the whole of the lights and ventilating fans in the building switched on, so as to enable a maximum reading to be taken. This meter can usually be best inserted at the main double-pole switch; and fig. 1 shows an extremely easy manner in which the loads on comparatively small circuits can be taken, without breaking any connections.

As the switch is closed, a piece of thin mica, marked A, is inserted between the blade and the contact, and the circuit is made afterwards, *viâ* the meter, by means of insulated testing points. After noting the amperes in each circuit, a further test should be made to determine the pressure between the poles of each main switch, as it may sometimes be found that three wires come in from the street mains giving two different pressures. The consumption thus obtained should be worked out in watts for each circuit, and checked by taking hourly readings of the supply authority's integrating watt-hour meters at a time when all the circuits are fully loaded.

A particularly successful installation of this kind was recently laid down at the Empire Theatre, Plymouth; and the writer proposes at this point to give the test-load figure of this particular hall, and, later on, go into the consideration that dictated the installation of the type of plant that is now running there.

### Test of Circuit at the Empire Theatre, Plymouth.

Projector lantern circuit maximum load—
70 amperes × 70 volts . . . . . = 4900 watts
Illumination circuits—
No. 1 circuit. Main hall and outside decorative lighting (test taken at main switch).
30 amperes × 100 volts . . . . . = 3000 watts
No. 2 circuit. 300 ruby miniature lamps in vestibule (test taken at main switch).
22 amperes × 100 volts . . . . . = 2200 watts

*Summary of Total Demand.*

| | |
|---|---|
| Lantern . . . . . | 4,900 |
| No. 1 circuit . . . . . | 3,000 |
| " 2 " . . . . . | 2,200 |
| | 10,100 |

These figures indicated that the hourly consumption on No. 1 circuit was 3 units, while that on No. 2 amounted to 2·2 units; and hourly readings taken on the watt-meters on these circuits verified the above observations. The maximum demand of some particular picture hall having been ascertained, an estimate showing the saving to be effected and the probable costs of generation should be drawn up and placed before the proprietors. The total generating costs will be made up as follows: Interest on capital cost, depreciation, running cost, labour, oil, and insurance.

With regard to the item for labour, this is a charge that must vary with local conditions; but in view of the very small amount of attention required by a modern plant of this description, it is found in the majority of cases that the installation of a private plant does not make any difference to the wages bill. The attendance charge may be exactly what the management is wise (or foolish) enough to make it. In most picture theatres there are two operators on the staff, who could between them give the plant the hourly inspection which, though not necessary, is advisable. An increase in salary in consideration of the extra duties would, no doubt, be expected, and should be given and charged to attendance. To pay a man to devote the whole of his time to a plant of this description is simply throwing money away, creating a sinecure, and, in the course of time, adding another to the great army of "work-shys."

Interest, depreciation, oil, and insurance charges constitute a fixed charge per annum, and affect the price per unit in inverse ratio to the number of units generated; while the running costs—namely, the charge for gas consumed—are proportional to the number of units generated, and will be found to vary from 40 cubic feet of gas per unit in a 6 kilowatt installation to 25 cubic feet of gas per unit in a 50 kilowatt plant.

It will be seen that the higher the daily load factor is, the smaller will be the rate per unit in regard to all charges, save that for gas consumed—in other words, the longer the running hours per day, the lower will be the generation costs per unit produced.

### Stand-by Charges.

Before the details of the plant are decided upon, the question of stand-by charges should be tackled, and the local electricity supply authority requested to state upon what terms they are prepared to furnish a stand-by supply. These terms vary a great deal with different authorities. Some make a stand-by charge per kilowatt per annum, and a further charge per unit metered should the stand-by be called into use; while others make no standing charge per annum, but charge a particularly high figure per unit if the current is consumed.

Many cinema proprietors paying a standing rate per annum for the privilege of having a stand-by supply, are themselves to blame for the heaviness of these charges, inasmuch as, when entering into their agreement with the supply authority, they neglect to state the minimum kilowatts with which, in the event of a failure of their own plant, they can keep things going, or let the supply authority decide this for them. This remark applies more especially to those theatres whose general illumination load is a comparatively large one. Much of this load can, in the event of having to switch over on the stand-by, be dispensed with, the lantern load can be reduced to some extent, and the sum total of the two loads brought down to a figure much smaller than that on which in many cases the annual stand-by charges are based.

It will shortly be shown that, in the case of a cinema having a large illumination load, there exists a strong argument in favour of the installation of two generating sets of equal capacity. In such a hall this combination offers economical possibilities that cannot be attained by the use of one engine, quite apart from the

fact that it enables the stand-by supply (which it is admittedly wise to retain with a single plant) to be entirely dispensed with, and in consequence relieves the management of a charge which, in most cases, is sufficiently heavy to amount, in a year's time, to more than the actual difference between a single installation and a wisely-rated duplicate plant.

Allusion has been made to the economical possibilities of a duplicate plant; but the writer would hasten to point out that he does not for a moment advocate the laying down of two generating sets of sufficient capacity to deal singly with the full load, at least for moderate sized provincial halls, though in the case of a large cinema the outlay might be justified.

The load-factor has an important effect upon the economical operation of a plant, whether it be steam or gas driven, and should be kept as high as possible. In a cinema having a large illumination load, the lantern demand may be about 50 per cent. of the total load, and in daylight hours the load-factor would be only just over 50 per cent., or even less in a liberally rated plant.

The effect of this low load-factor would be that the efficiency of the engine would be 16 to 18 per cent. lower than would be the case if it were fully loaded; in other words, it would take 16 to 18 per cent. more gas per unit of electricity generated under these conditions. This, in the case of an engine running at 50 per cent. load-factor on a 70-ampere 70-volt cinema daylight load, would mean (on the basis of 42 cubic feet of gas per unit generated) that 35 cubic feet more gas per hour is being used than would be the case if this daylight demand provided a full load for the plant. The extent to which these conditions effect the generation costs would vary with the season. At midsummer, they would be responsible, in the case under review, for an increased consumption of about 1200 cubic feet per week; while on the darkest winter day its effect on the consumption would not be more than about 400 cubic feet per week.

The influence of this factor upon the economy of the plant is proportional to the respective values of the daylight and night loads; and although the use of a duplicate plant would enable either one or both sets to be run at their highest efficiency, it must be remembered that this commercial consideration alone is certainly not sufficient to warrant the installation of two complete generating sets except in the case of a theatre in which the daylight load factor cannot be kept above 40 per cent. Then a smaller set should be put in to deal with the lantern load *plus* the small amount of hall lighting during daylight hours.

The real arguments in favour of a duplicate plant are: (1) The avoidance of stand-by charges; (2) the technical advantage of keeping the plant up to its full load. Dealing with these arguments separately, the first is obvious. If a cinema proprietor has to pay a weekly charge for the privilege of having a supply at hand which he may never want, the chances are that this charge quite wipes out the economy that the installation of a private plant is effecting. As pointed out under the heading of "Stand-by Charges," there is a method by which these charges can be controlled; and where a stand-by supply is unavoidable, the declared kilowatts needed should be kept at a minimum.

As regards (2), it is a well-known fact that, apart from the question of increased consumption due to a poor load factor, the operation of a plant under light loads does not conduce to low maintenance charges. An engine working under constant conditions of load and run well up to its normal capacity will give much greater satisfaction and more consistent operation than one working at a light load for many hours, and then for only a short time called upon to deal with 100 per cent. increase.

The gas used by an engine may, from a commercial standpoint, be divided into two quantities. One amount is "frictional" consumption, and is that used to overcome the inertia and friction of the moving parts, and is a constant factor quite irrespective of the load; while the other portion is that used to supply the brake-horse-power required at the pulley, and varies with the load. The ratio between this frictional and useful consumption becomes greater as the load increases, and may be expressed as a percentage denoting the efficiency of the engine.

In the earlier part of this article, some reference was made to the Empire Picture Theatre, Plymouth, where a particularly successful duplicate plant was recently installed. The main consideration which in this case led to an installation of this nature was the avoidance of stand-by charges. The daylight load is in the neighbourhood of 5 kilowatts, while the night load is just about double this demand. Two 6 kilowatt dynamos, belt coupled to two 10 to 11 B.H.P. gas-engines are installed, and are run on the following lines: The show, which is a continuous one, opens at 2 p.m. and runs on the No. 1 set until dusk, when the No. 2 set is run up and switched on the lighting load by means of change-over switches on the main switchboard. At 9.45 p.m., the lighting load is reduced, and the lantern load switched over to No. 2, on which set the show is finished. The two sets are run alternately upon these lines—a practice that enables them to share the week's work equally. Each set is so rated as to be capable of running the show right through from start to finish should occasion arise, and is capable of furnishing enough current for projection purposes and for a sufficient amount of lighting.

This rating keeps the initial outlay as small as possible, and gives most satisfactory results. From the first run on Feb. 23 last up to the date of this article the plant has daily run on the lines indicated without a single hitch. The generation costs over this period, taking all charges into consideration, amount to 1·18d. per unit. Alternative schemes were drawn up for this theatre; and it is interesting to note that the installation of a duplicate plant only amounted to 30 per cent. more than would have been the expenditure on a 12 kilowatt single set.

### Plant Detail.

The rating of the plant having been determined, the question arises as to whether belt or direct-coupled sets should be installed. A direct-coupled set has little to recommend it so far as small units are concerned, and should only be installed where space is so limited as to quite preclude the installation of a belt-drive. A dynamo suitable for direct coupling to a gas-engine having a speed of (say) 250 revolutions per minute will cost 150 per cent. more than (say) a 1250 revolution per minute machine, and will be found to add about 40 per cent. to the total cost of the installation. The efficiency of a dynamo becomes less as its speed decreases; while the mechanical advantages in the way of low maintenance charges which it is said to possess, due to its low speed, are not borne out in practice.

With the introduction of jointless belts and the improved governing characteristics of the modern gas-engine, troubles that were once incidental to high-speed belt-drives have become things of the past. In an installation recently laid down, with which the author was connected, the drive is taken direct from a 4-feet engine fly-wheel, and passes over a 17-inch pulley on the dynamo shaft. The engine speed of 320 revolutions per minute gives the belt a speed of about 4000 feet, at which speed the Hendry jointless belt runs quite steadily with a slip which, repeated tests have proved, is practically negligble.

In laying down a belt-driven plant, the distances between the respective centres of the engine and armature shafts should preferably not be less than 10 feet; but the author may say that, if space demanded it, he would not hesitate to use much shorter centres in preference to installing a direct-coupled unit of small size. A backward drive from the engine, with the slack side of the belt underneath, is not desirable; but if occasion demands it may be used, provided that sensible proportions be observed in the diameter of the driver and driven pulleys.

A common fault found in many belt-driven plants is that the dynamo speed is so high as to necessitate a very small pulley. The smaller the diameter of the dynamo pulley, the greater tension has to be kept on the belt in order to prevent excessive slip; and, as a consequence, the efficiency of the plant is slightly, and the life of the belt greatly, reduced. A 12-inch diameter pulley is quite small enough for the dynamo; and if this will not give the armature the correct speed, the makers of the engine should be requested to supply a larger sized driving pulley on the engine shaft—a very small matter. This remark, of course, applies to the standard electric light engine having a driving pulley mounted on the crank-shaft between the fly-wheel and an outbearing.

### Dynamos.

In these installations a dynamo of the level compounded type should invariably be specified. A plain shunt machine may, of course, be put in; but with this type it will be found that a large amount of hand pressure regulation will be required, whereas with a compound machine the pressure will, to a large extent, take care of itself.

In the case of a small cinema having a motor generator set and contemplating turning over to private plant, a fact that must not be lost sight of is this: If the dynamo of the motor generator is a liberally rated machine so far as the requirements of this particular cinema are concerned, it may be profitable to uncouple it, fit a pulley in place of the half coupling, and run it from the engine; thus saving an expense of about £30. This would, of course, only be practicable in a small show; but it is a point worth noting. The motor could be removed from the combination bed-plate, fitted (if necessary) with a pulley, and sold. If it is intended to make use of the motor generator in this manner, a scale drawing of the dynamo should be made, a crowned pulley of a suitable diameter ordered, and scaled-in on the sketch, from which the dynamo bed can now be accurately laid out. The work of uncoupling the dynamo, fitting the pulley, and installing it on its new bed, should not take more than a couple of hours.

### Switchgear.

This is bound to vary considerably according to the nature of the plant and its stand-by. If more than one, each dynamo should have a voltmeter, ammeter (preferably, the shunted type), a double pole main switch, and a pair of fuses, and, whenever practicable, the switchgear should be situated in the operating room. Where the lantern and the illumination load about balance each other and duplicate sets are installed, no advantage is gained by running the dynamos in parallel. Fig. 2 (p. 286) shows a scheme of change-over switches by which it is possible to throw either the illumination or the lantern load on either No. 1 or No. 2 dynamos without at any moment placing the machines in parallel. Where two sets are installed, and it is desired to run them in parallel in order to equalize the load, triple pole main switches should be provided; the third pole being used as an equalizer, as shown diagramatically in fig. 3. The arrangement outlined in fig. 2 will, however, be found ample for the requirements of most duplicate plants.

### Linking-up with the Stand-by.

Where a single engine and dynamo is supplemented by a stand-by from the public mains, the method of linking-up with this

stand-by becomes at times a difficult one, especially if the private plant generates at 70 volts—a figure that has been shown to be most economical for moderate-sized provincial shows. The current for the lantern can always be broken down by means of resistances; but it is quite out of the question to have to run

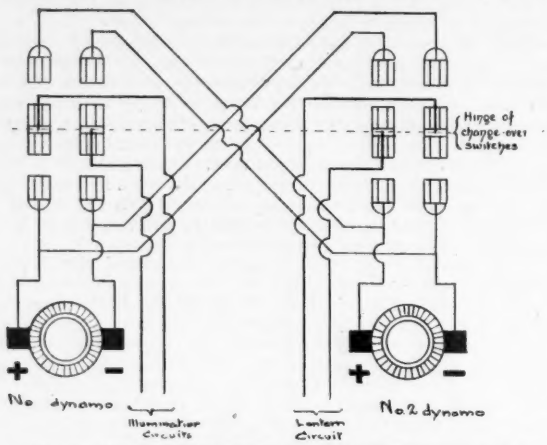



**Fig. 2.—Diagrammatic Sketch showing Two Dynamos and Change-Over Switches.**

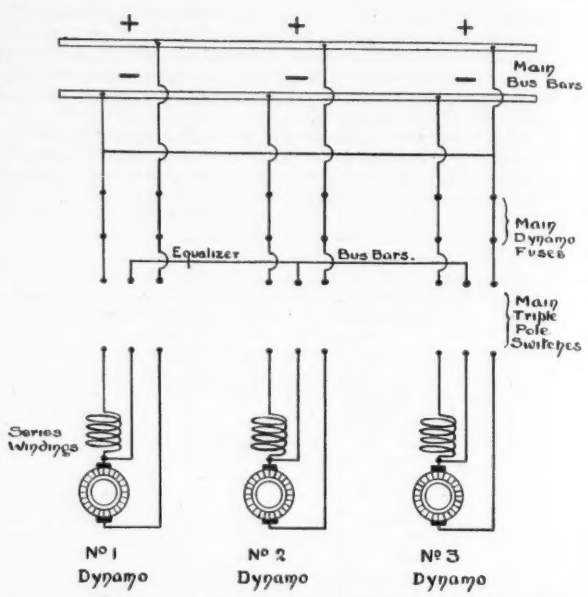



**Fig. 3.—Diagram showing Three Dynamos for Parallel Operation.**

around changing lamps in the comparatively rare event of having to fall back on the stand-by.

*The Case of an Alternating Current Stand-by.*—The chief advantage of an alternating current is the facility with which its pressure can be changed. When the public supply is of this character, both lantern and lighting circuits can be linked-up to the stand-by *viâ* the change-over switches on the circuits and two static transformers.

*The Case of a Direct Current Stand-by.*—The motor generator on which the show operated prior to the installation of its own plant should be kept on the supply mains, and its dynamo side linked-up *viâ* change-over switches to both the arc and lighting circuits. An ammeter should be kept in the dynamo circuit in order to ensure the machine not being overloaded should the stand-by be requisitioned.

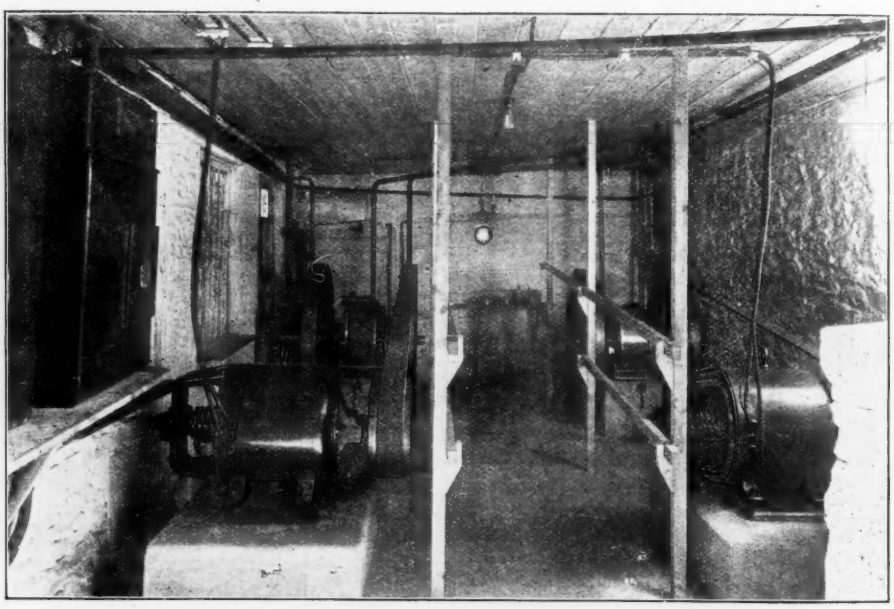


**Fig. 4.—The Electrical Plant at the Empire Theatre, Plymouth.**

### Theatre Wiring.

When it is decided to instal a 70-volts private plant, it must not be forgotten that, providing 70 volt lamps, of the same candle power and hence of the same wattage, are installed, the amperes in the theatre circuit will be increased by nearly 50 per cent., assuming that the previous pressure has been at 100 volts for circuit-lighting.

If the wiring contractor has carried out his work in a conscientious manner, these altered conditions will not result in any overload on the wires. But, if in the first place the copper has been cut unduly fine, then the circuits are likely to become loaded beyond their proper capacity, and overheating is bound to occur. If the wiring contractor cannot, or will not, say what gauge wire he has put in, the circuits should be bared at some point, a wire gauge applied, and the safe load thus quickly and easily determined. If carbon lamps have been used, installing metal filament lamps will bring the amperage back to a safe figure.

Fig. 4 shows the duplicate sets installed at the "Empire" Theatre, Plymouth, to which allusion has already been made. Attention may be drawn to the liberal proportions of the dynamo pulleys, which contribute largely to the small amount of slip occurring on these sets.

Fig. 5. shows a particularly successful plant of this type which the British Westinghouse Company have installed at the Pavilion, Stratford. It is a typical example of a large number of Westinghouse plants—complete in every detail from gas bag to switchboard—installed in different parts of the country for running animated picture theatres. It may be remarked that the attitude of the Westinghouse Manufacturing Company towards the

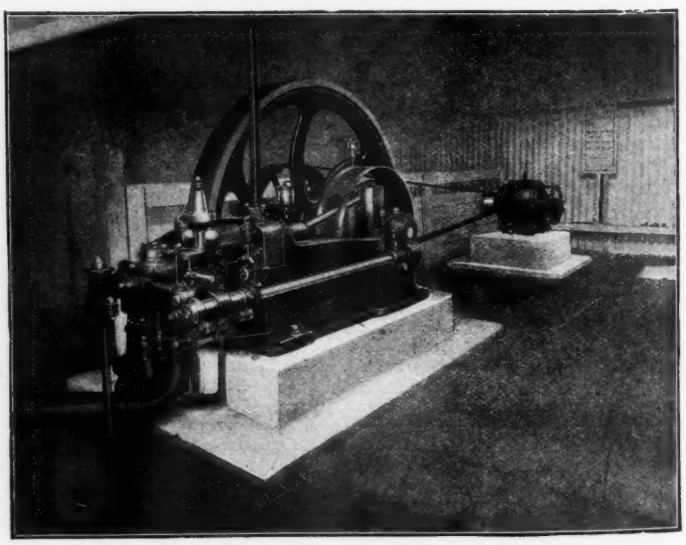


**Fig. 5.—The British Westinghouse Company's Engine at the Stratford Pavilion.**

animated picture industry is significant of the extent to which the leading electrical firms are laying themselves out to meet the requirements of the Cinema trade. Not very many years ago the majority of the electrical manufacturing companies looked askance at this industry—regarding it in the light of a passing craze. Any suggestion that they should specialize in apparatus for this particular class of business was received with but little enthusiasm. To-day, it is fully recognized that the picture theatre has come to stay, and most large electrical manufacturing firms specialize in apparatus peculiar to the moving picture industry.

In conclusion, the author desires to express his sincere thanks to Mr. Percy S. Hoyte, the Chief Engineer of the Plymouth and Stonehouse Gas Company, to whose unflagging efforts the success that has attended this particular phase of the Company's enterprise is entirely due, and by whose courteous permission these notes have been compiled and submitted to "JOURNAL" readers.

## SCRUBBERS FOR THE PURIFICATION OF GAS.

Herr Carl Heine has taken out a French patent [No. 466,349] for a scrubber for the purification of gas. It consists of obstructing or stopping surfaces placed inside a suitable receptacle at a certain angle with the stream of gas and with the side of the vessel, openings for the passage of the gas being made between the surfaces and the side. The apparatus is constructed so that the liquid or gas which effects purification is introduced in the same direction as the gas to be purified. The invention is based upon the theory that the gas to be purified and the liquid to be employed in the operation can be more closely mixed by making both of them impinge simultaneously upon the obstructing surfaces. The efficiency of the apparatus is increased when a liquid is employed not only for purifying but also for cooling the gas. To drive down the hot gas which tends to rise into the upper part of the apparatus, and thus utilize the purifying power of the latter in all its height, it can be provided with blast-pipes for injecting a suitable fluid.

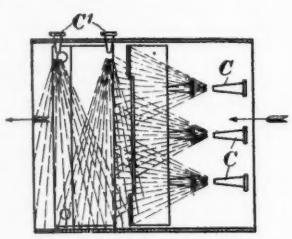


Fig. 1.

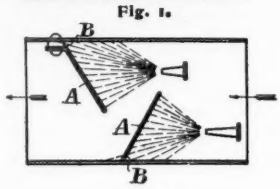


Fig. 2.

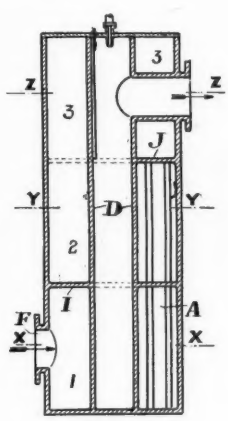


Fig. 4.

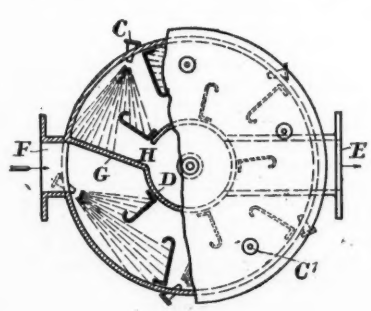


Fig. 3.

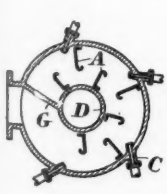


Fig. 5.

Fig. 6.

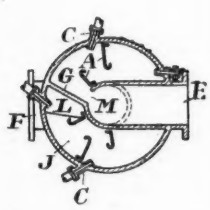


Fig. 7.

The invention is represented, by way of example, in the accompanying drawings. Figs. 1 and 2 are a plan and an elevation of the apparatus. Fig. 3 is a plan and partial horizontal section of a circular purifier. Fig. 4 is a longitudinal section of a variant. Figs. 5, 6, and 7 are sections of fig. 4, on the lines X, Y, Z.

In the form of apparatus shown in figs. 1 and 2, the receptacle, which serves as a casing to the apparatus, contains obstructing surfaces A, placed at a certain angle. At the top of these surfaces there are openings B. Blast-pipes C project into the gaseous current of water or air, which enters the apparatus in the direction shown by the arrow. Other pipes C¹, on the lid of the apparatus, send downwards a certain quantity of water or air.

Fig. 3 shows a form of construction in which the gas circulates in rings. With this object a cylindrical tube D, concentric to the outer jacket of the apparatus, and perforated with a series of holes along its length, is placed inside the scrubber. It is branched on to a discharge-pipe E. The gas passes into the apparatus through the pipe F, is arrested by the partition G, and compelled to describe almost a complete circle before it can penetrate through the opening H into the pipe E. The first-mentioned pipes (those projecting the gaseous current on to the surfaces A) are as before shown at C ; and others, C¹, on the lid, drive the hot gas to the bottom of the apparatus. Apart from the circular motion of the gas, the action of the appliance is the same as that of the one previously described. There is, however, this advantage in circular motion, that it prolongs the passage of the gas, and consequently improves the purfication.

To increase further the efficiency of the apparatus, it can be made with several superposed compartments communicating with each other, so as to make the gas pass successively through them, each time undergoing changes in direction which are favourable for purification. A scrubber or purifier of this kind is represented in figs. 4 to 7. It is similar to that of fig. 3, and formed of a cylinder closed at the top and bottom, and having inside a second cylinder of smaller diameter. Intermediate plates I J, at different heights, divide the receptacle into three superposed chambers 1, 2, 3. The lower compartment receives the gas through the pipe F. The various compartments contain obstructing surfaces A, against which the gas is projected by the pipes C, which themselves project, in a very divided state, water or other suitable fluid. The middle chamber has an opening K (fig. 6), and the chamber J another, L. The interior cylinder D is closed on all sides, but communicates with the outer one by the pipe F, and with the upper compartment by the opening M. The gas enters the apparatus through the pipe F, and moves in a circle in compartment No. 1 to reach the orifice K, through which it enters No. 2. The gas is then made to pass in a circle through this compartment also to reach the orifice L in the bottom of No. 3. It must then move in a circle in this compartment to reach the orifice M of the inner cylinder, which conveys it to the discharge-pipe B.

The interior cylinder can be utilized to complete the purification of the gas ; and for this purpose a certain quantity of water or other suitable fluid can be injected into it from the top. Seeing that there is no appreciable movement of the gas in the lower half of the inner cylinder, the particles which constitute the impurities, and which are at this moment made heavy by moisture and precipitated, are deposited in large quantities on the bottom of the interior cylinder. This is very favourable to purification. The surfaces A can be arranged and distributed in the various stages of the apparatus according to one of the ways indicated, or in any other suitable manner.

Without departing from the scope of the invention, one can, of course, employ instead of the water or air any substance which purifies gas, and inject it into the scrubber to obtain purification and a result which is both mechanical and chemical. Injection of the purifying and cooling fluid into the gaseous stream employed concurrently with obstructing surfaces has for effect "a complete washing of the gas, though only requiring a small consumption of material and power."

## AN IMPROVEMENT IN VERTICAL RETORTS.

In order to utilize some of the heat contained in the coke leaving a continuous vertical retort for the distillation of coal, it has been proposed to make the primary or secondary air, or both, pass into regenerating flues arranged round the lower part of the retort, so as to convey a portion of the heat of the coke either to the regenerator or to the heating flues of the retort, or to both. Though this device allows the extraction of a certain quantity of heat, it does not raise the temperature of the air sufficiently, and it is always necessary to provide one or more distinct regenerators to obtain the best results.

An arrangement for which a French patent [No. 467,445] has been taken out by the Compagnie Générale de Construction de Fours obviates, it is claimed by the inventors, this additional construction by making the waste gas pass through flues in contact with the regenerating flues through which cold gas, such as primary or secondary air or both, or the cold regenerator gas, passes round the lower part of the retort. Thus the air or gas to be heated is, as it were, laminated between the hot retort and the waste-gas flues. The invention is specially applicable to the type of retort which is heated downwards, as the heating flues can then be prolonged near the base to form the waste-gas flues which surround the air-heating flues or are in contact with them.

In the illustrations on next page, fig. 1 is an elevation of the lower portion of a retort and a vertical section of the adjacent parts of the setting; fig. 2 is a horizontal section of fig. 1—left

side on the line Z of fig. 1, right side on the line Y; and fig. 3 is a vertical section on the line X.

The retort A is heated by nearly cold producer gas, which enters through the pipe B. The draught sucks this gas through regenerating flues C in the side walls of the retort, at the place where the hot coke is before leaving the retort. Thus heated, the gas rises in the flues D as far as the upper part of the heating flues E, where it meets the secondary air. These flues are prolonged towards the base, to a point opposite the flues C, so as to form flues for the waste gas, which escapes through the flues F to

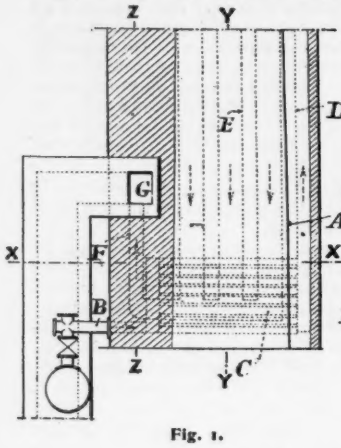


Fig. 1.

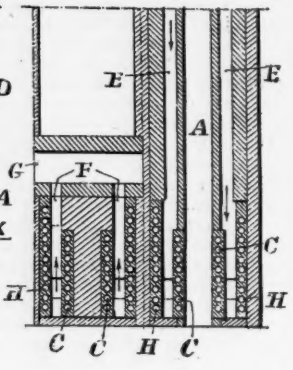


Fig. 2.

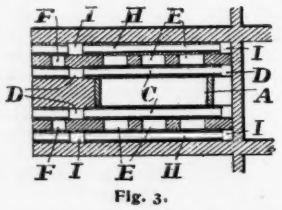


Fig. 3.

a main flue G leading to a chimney. The secondary air is sucked through the flues H into the sides of the prolongations of the heating flues, and ascends in the flues I so as to meet the gas at the upper part of the heating flues.

When the producer is near the retort, so that the gas cannot lose its heat before being burnt, the flues C serve to heat the primary air, or, if this is not necessary, they can be utilized, together with the flues H, to heat the secondary air; or the last-named flues can be omitted, and the flues C alone made to serve for the secondary air.

## GAS-FIRED STEAM-BOILERS.

**By the Engineering Correspondent of the "Yorkshire Post."**

In the course of an interesting article in the Engineering Notes of the "Yorkshire Post" last Tuesday, the correspondent of our daily contemporary gave some particulars of the working of the Terbeck burner for the heating of steam-boilers.

He writes: In the early days of the utilization of blast-furnace and coke-oven gas for power-generating purposes it was freely prophesied by the makers of gas-engines that the gas-fired steam-boiler would entirely disappear and its place be taken by the large gas-engine. This is what ought, by all the patents, to have happened; yet it has not worked out so. Despite the steady improvement of the gas-engine, gas-fired boilers have become relatively even more popular, particularly for colliery work. In view of this continuous increase, the question of the efficiency of the different types of gas-boiler and of the various devices used for securing the effective combustion of the gas, deserves much closer investigation than it has hitherto received. Blast-furnace and coke-oven gases are bye-products; and on this account there is a tendency to regard economy in their use as unimportant. It is frequently pleaded that an output of 4 lbs. of steam per square foot of heating surface (which is at present regularly obtained) is good enough, and that so long as output is secured, efficiency does not matter very much. This attitude was rational enough when power needs were much below the capacity of the available gas; but now, when the opportunities for the profitable employment of power are multiplying daily, it is altogether short-sighted. Bye-product gas has a determinable value; and to use it inefficiently is to waste potential wealth. The money value of the surplus gas from a battery of fifty colliery coke-ovens will average, for instance, £5000 a year, or, roughly, 1s. per ton of coking coal used. Blast-furnace gas involves even larger sums. It represents a money value of 5s. 6d. for each ton of coke (reckoned at 10s. per ton) used in the furnace charge; so that an iron-works consuming 150,000 tons of coke per annum will have at its disposal blast-furnace gas worth £40,000.

The earliest appliances used in iron-works for burning blast-furnace gas under boilers consisted mostly of an external fire-box lined with fireproof material—it being thought impossible to bring the gas (which owing to its low heating value gave a low-temperature flame) into direct contact with the boiler flue, without running the risk of putting out the flame through the cooling action of the flue walls. By properly controlling and regulating the air admission, however, a flame hot enough to stand up against the cooling action is now obtainable; and this difficulty is consequently overcome. Yet most of the systems of burning blast-furnace gas are still of low efficiency, due mainly to the high temperature of the combustion chamber, and the consequent heavy losses of radiation, which are seldom less than 10 per cent. Although it is upon these losses and the loss of heat in the flue gases that the efficiency of a gas-fired boiler largely depends, until recently very little has been done to get precise data in regard to them. But the matter is now receiving attention; and at a recent meeting of the Westphalian Engineering Association Herr Birkholz gave the results of researches he has been making into the subject.

The most reliable way of determining the efficiency of steam-boilers is that of measuring the water evaporated, and the fuel consumed, over a fairly long trial period. It was formerly not so easy to do this with gas-fired boilers, as is the case with coal-fired, in which all that is necessary is to weigh the coal. But during the last few months great advances have been made in methods of measuring gas; and the volume actually consumed can now be determined with accuracy. The efficiency of a boiler, as already pointed out, depends on the losses of heat by radiation, and in the flue gases being kept at as low a temperature and heat-value as possible. The radiation losses can be considerably reduced by suitable modification of the boiler; and the radiation surfaces of the boiler are now being provided with an additional jacket, preferably consisting of a wall, half-a-brick thick, set up about 3½ to 4 inches from the boiler. The intermediate space is filled up with slag wool, and the brickwork of each boiler is given several coatings of tar, renewed every six weeks, so that leakages in the brickwork are prevented—especially when any cracks found are filled up with tar immediately. With the usual casing of brickwork, allowances of 10 per cent. for radiation in the case of fluid boilers, and 5 per cent. for water-tube boilers, may be taken as correct—always provided that the boiler is being properly utilized. Ascertaining the losses of heat in the flue gases is a much more difficult matter, and entails measurements of the temperature and carbon dioxide contents. It is generally known that the carbon dioxide content of the flue gases affords a measure of the excess of air on which the height of the combustion temperature depends, and, therefore, gives an indication of one of the mean factors in the absorption of heat in the boiler. Unfortunately, though the inferences and rules to be deduced from the percentage of carbon dioxide in the flue-gases of coal-fired boilers are now well understood, the whole matter as relates to gas-fired boilers is still obscure; and makers of carbon dioxide indicators would do well to turn their attention in this direction.

The principal requirement to be fulfilled in gas firing is that combustion must take place at the immediate point where the gas enters. This follows from the fact that the absorption of heat, and therefore the economy of the boiler, depends entirely on the fall in temperature of the heating gases during their passage through the boiler. It is sometimes supposed that if a bright flame is observed throughout the whole length of the boiler-flues all is well. But, in fact, such a fire is as wasteful as it could conceivably be; for, obviously, the gases which are burning brightly at the far end of the flues will pass away at a high temperature, and carry off much of the heat that ought to have been turned to account.

The burner should not be mounted, as is often done, inside the boiler-flue; for in that case, since the heating effect does not commence for the first 3 feet or so from the gas-nozzles, about 10 per cent. of the flue, or about 7 per cent. of the total useful heating surface of the boiler, is inoperative. It is better to provide a fore-chamber to house the incoming gases for this first 3 feet, in which case combustion will begin just as they enter the intake flue. It is also of the utmost importance to see that the combustion is effected with a non-luminous flame. Too little attention is given to this—particularly in the case of boilers fired with coke-oven gas; and this is the more reprehensible since no more than a glance into the boiler is needed to see whether or not the burner is giving a non-luminous flame.

The two main requisites here indicated—a flame giving perfect combustion as soon as possible after the entry of the gas, and a non-luminous flame—are obtained in the highest degree in burners on the bunsen principle. A further consideration is that the air supply must not be allowed to depend on the chimney draught; otherwise it will not be possible to check the velocity of the gases (so as to ensure the abstraction of the largest amount of heat) by throttling the chimney damper without lessening at the same time the air supply and altering the character ot the flame.

Thus the modern burner is of the bunsen type. The gas enters through a nozzle, and draws the primary air after it through an annular disc-valve; a thorough mixture of the two taking place during their passage through the mixing-tube. Provision against lighting-back is made by tapering the gas-nozzle. The intakes for gas and air are under separate control, and can be accurately adjusted; and the amount of indrawn air varies automatically with the pressure of the gas. Precautions against explosions due to sudden increases of gas pressure, resulting in the blowing out of the flame, are provided against by fitting a sensitive blow-off

safety-valve to the gas-inlet pipe, and by constructing fire-brick chequer-work about 6 feet away from the nozzle, which, having once become white-hot, will ignite the gases should the flame be momentarily blown out.

With the Terbeck burner, which is of this type, efficiencies of 75 and 80 per cent. have been obtained over prolonged trials with coke-oven gas—from 0·24 lb. to 0·28 lb. of steam being generated per cubic foot of gas burned. The theoretically ideal amount of carbon dioxide in the flue gases was calculated to be 25 per cent.; and analysis showed that the actual amount present was between 23 and 24 per cent., which corresponded approximately to the 10 per cent. excess of air allowed in designing the burner. It is asserted that by attending sufficiently well to details, an efficiency of 90 per cent. can be obtained without difficulty. The sphere of employment of gas firing has been greatly enlarged during the last few years; and at present not only steam-boilers, but also superheaters and Cowper blast-stoves, are heated with blast-furnace gas, coke-oven gas, Mond gas, coal gas, and natural gas. Gas-burners are being used for drying foundry ladles and moulds, heating stills, for the recovery of bye-products, and pans in chemical works. One entirely new application is for central heating boilers for workshops and offices; but this system can only seriously be considered where cheap gas is available.

There is much yet to be done to render gas burning ideally efficient. Herr Birkholz indicates two matters which would repay investigation. One, the means of determining and evaluating carbon dioxide in the flue gases, has already been mentioned. The other concerns the preheating of the boiler water in an economizer. He suggests that a great service would be rendered by anyone who could devise a preheater enabling the gas temperature to be reduced to below 100° C. before passing into the stack; since such an apparatus would economize heat now expended in raising the water to boiling point.

## Gas-Workers as Territorials.

A meeting of the younger employees of the Plymouth and Stonehouse Gas Company was held at the works last Wednesday, in connection with a local movement for the strengthening of the Territorial force. It had been convened by the Directors, and was presided over by Sir Joseph Bellamy (the Chairman of the Company); all employees under 30 years of age having been invited to be present. Sir Joseph explained that the Commander of the South-Western Coast Defences had called attention to the fact that there was a deficiency in the number required to man the forts at Plymouth, and had issued an appeal to the people of the Three Towns to make this up. The Directors of the Gas Company were very anxious to give facilities for their employees to join the Territorials; and any difference between the War Office allowance and their wages the Company would make up. When the time came for promotion, the Directors would recognize the young fellows who showed themselves ready to make a little sacrifice for their country. Wholesome discipline would be for their own benefit; and the work required of them in connection with either the Royal Garrison Artillery or the Fortress Engineers would add to their training as mechanics, and be of advantage to them in after-life. In future when engaging youths the Company would give preference to those who formerly belonged to cadet corps, Boy Scouts, or the Boys' Brigade.

**Mishap at Leeds Power Station.**—A temporary failure of the current at the Leeds power station (by which the tramway system was partly disorganized) was caused by one of the employees inadvertently causing a short-circuit while examining some switch-gear. The man was badly hurt; it being found, on removal to the infirmary, that he had received serious burns on the face and injuries to the eyes.

**Electric Traction Fires.**—Travellers by electric tramcar and rail in London last week were subjected to some alarm from outbreaks of fire. On a tramcar at Stratford, wires at the rear of the driver's platform fused, and the vehicle was immediately enveloped in flames. A passenger suffered severely from shock; while the driver was badly singed. The second incident occurred on the District Railway; the rear coach of a train catching fire just before reaching Southfields Station. The train ran into the station, and the passengers alighted unhurt; but extensive damage was done to the carriage, and to the woodwork beside the line.

# CORRESPONDENCE.

*[We are not responsible for opinions expressed by Correspondents.]*

## Gas-Cookers—British and German.

Sir,—I have read with interest your article in the "Journal" of July 21, in which you refer to the comparative merits of British and German gas-cookers. I have been familiar with this type of cooker for many years, and no one can question the fact that, for show-room purposes, the white enamelled German cooker is very attractive in appearance. But I do not believe the light construction of the German cooker would stand the hard wear and tear which is demanded by English gas companies in cookers which they hire-out to their consumers. Apart from this, there is the important fact to be borne in mind that different countries have different methods of cooking. On the Continent, the large joint, which is the staple of the English household, is practically unknown. Consequently, a smaller oven of lighter construction is sufficient for their purposes.

Some years ago an attempt was made to find a market for these German cookers in London; but the attempt proved unsuccessful, owing to the fact that it did not appeal to the English taste, nor did it suit the English requirements. The same causes prevent the French coal-stove from establishing any market in this country. I had a conversation some time ago with the largest manufacturer of French kitchen ranges—admittedly excellent in design and eminently suitable to the French requirements. He showed me a particular type of coal-range of which they sold, on an average, 30,000 a year in France. He had made great efforts to sell this same type in England, but without any success whatever. Nothing is more difficult than to change the national habits of a people; and it will be found that where different types prevail, there is a genuine reason for this variation.

There is one point on which the German and Continental gas-cooker is worth careful consideration; that is the closed-top cooker, which they very generally adopt. This system enables a large number of cooking utensils to be kept at a simmering heat with a very economical consumption of gas—that is to say, with only one boiling burner in use, the heat is carried underneath the closed top; and as a large proportion of Continental cookery consists of slow cooking or simmering, they undoubtedly attain a high economical efficiency.

You have done good service, however, in calling attention to the Continental type of cooker, and gas-stove makers in this country must keep their eyes open to any improvements which will really appeal to the English consumer. But our old English ideas of solid workmanship will always appeal to the English buyer and consumer.

25, *Princes Street, Oxford Circus, W., July* 29, 1914. A. P. Main.

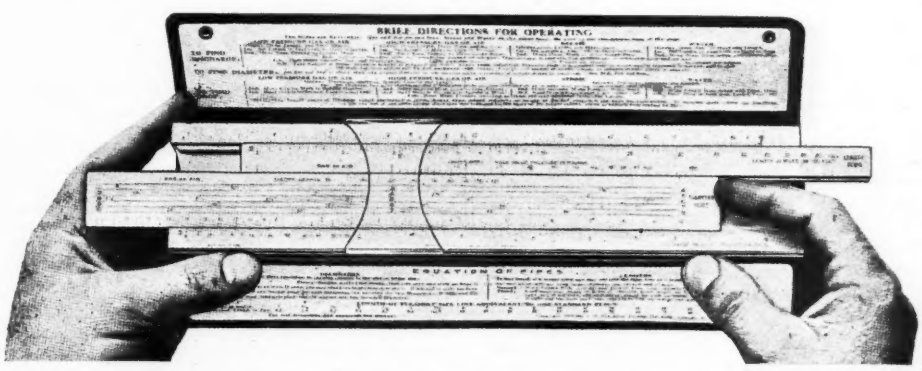
## Calculating the Flow of Gas in Mains.

Sir,—In the issue of the "Journal" for June 30, on p. 1042, reference is made to the slide-rule of M. Aubery for calculating the flow of gas in mains

M. Grebel pointed out that in M. Aubery's formula the gas delivered is a function of $p_1 - p_2$, while in the modern formulæ [Chicago, Unwin and Cox] the gas delivered is a function of $p_1^2 - p_2^2$, where $p_1$ is the initial pressure and $p_2$ is the final pressure of the gas. The explanation of this fact is very simple. M. Aubery's formula as well as the slide-rule are limited to the flow of gas at low pressures where the variation in the density of the gas is so small that it can be neglected. M. Aubery's slide-rule may have divisions on the drop scale reading to 4200 mm.; but I am sure M. Aubery would not recommend its use for over one-tenth of the drop without making corrections for the expansion of the gas with the drop of pressure.

I would refer you to my paper entitled "Flow of Gas Formulæ" which was dealt with in the "Journal" about two years ago. Under the heading of "Flow of Compressible Fluids," it says: "To illustrate this principle, suppose the line is made of such length that the friction drop reduces the final absolute pressure to one-half of the initial. From Boyle's law for constant temperature, the gas will expand during this change to double its volume. This will double the velocity at the end of the line, and cut down its density to one-half. From the given equation, the effect of the density will tend to decrease the drop per unit length to one-half, while the effect of velocity will tend to increase the same four times. As a result, the actual drop per unit length will be twice as much at the end as at the beginning of the line."

In accordance with all this, it was shown further along that, for a




THE SPITZGLASS SLIDE-RULE AND FLOW COMPUTER—11 INCHES LONG, 2½ INCHES WIDE.

compressible fluid, the quantity delivered is a function of the drop or $p_1-p_2$ and also of the average pressure, which is 0·5 $(p_1+p_2)$; and when these two terms are multiplied, they form the product $0{\cdot}5(p_1^2-p_2^2)$. In the Chicago or Spitzglass formula $p_1-p_2$ is designated by P and 0·5 $(p_1+p_2)$ by A; and the formula is reduced to

$$Q = C\sqrt{\frac{PAD^5}{WL\left(1+\frac{3{\cdot}6}{D}+{\cdot}03D\right)}}$$

Where Q = cubic feet of gas per hour, reduced to standard conditions;
C = experimental coefficient of discharge;
P = drop of pressure = $(p_1-p_2)$;
A = average pressure in pipe = 0·5 $(p_1+p_2)$;
D = diameter of pipe;
W = density of gas, referred to air as unity;
L = length of pipe.

When the pressure of the gas is nearly atmospheric, the drop of pressure in the pipe is usually given in inches of water. Calling the pressure atmospheric (the difference being negligible), and putting A = 14·7 in the above equation, we have

$$Q = C\sqrt{\frac{HD^5}{WL\left(1+\frac{3{\cdot}6}{D}+{\cdot}03D\right)}}$$

where the notation is the same as before.

As you are aware, the Chicago or Spitzglass formula is the result of a large number of experiments, as shown in the paper.

Continuing the same work, I have perfected a slide-rule which affords a ready solution for problems which involve the laying-out of mains for high and low pressures. I contemplate transferring the rule to the metric system, as the field it embraces will undoubtedly warrant its international application. I am enclosing herewith a circular which shows the appearance of the rule, a description of which is as follows: The familiar A, B, C, D, slide-rule scales are used, being marked on the left end. On the right end, and in the middle, the scales are marked for the special features of the rule. Two scales are marked on the stationary part of the rule—the top or "A" scale, marked "Drop in Pounds, Feet, or Inches;" and the bottom or "D" scale, marked "Discharge in Cubic Feet, Pounds, or Gallons." The scales are read according to the fluid in question; in each case the unit usually employed being given in the directions on the inside cover of the rule.

The "B" scale is on the upper, or length, slide, and is marked "Length in Miles, or Hundred Feet" for gas and air (high pressure and low pressure respectively) and "Length in Hundred Feet" on the steam and water face of the slide. On the lower edge of the length slide is given a special scale marked "Mean Gauge Pressure in Pounds;" and an arrow-head corresponding with the twelve-pound reading on the gas and air face is marked "Gravity Mark," to be used in connection with low-pressure gas and air problems.

Another special scale, marked "Specific Gravity" (air equals 1) is given on the top edge of the diameter slide for gas and air, and a logarithm or equal division scale is given on the corresponding edge of the steam and water diameter slide. An arrow-head corresponding with 7·96 on the logarithm scale is marked "Pressure Mark," to be used in connection with steam-flow problems.

The main special feature of the rule is the plotting of the diameter lines in five horizontal rows on the diameter slide. These are marked in order from ¾-inch size to 48-inch size pipe. The line for each diameter is extended over the "C" scale (set on the lower edge of the diameter slide) to meet and indicate corresponding readings on the "D" or discharge scale of the rule. One column of heavy type figures in the middle of the slide and one on each end indicate the number of integer places in the discharge corresponding to the diameters of each horizontal row.

J. M. SPITZGLASS.

*Chicago, U.S.A., July* 16, 1914.

## Electricity Supply to Small Houses.

SIR,—Will you kindly allow me to correct a mistake in your issue of the 14th inst.

In a note under the heading "Electricity Supply Memoranda," you quote me as saying that at Wimbledon the revenue from the supply of current to 2000 small houses was £1000 per annum, and ask how it could pay if the Electricity Department realized only 10s. per annum from each house.

I fear I must have been misreported, as what I really said was that the receipts were £1000 per annum from 1000 houses, or an average of £1 per house per annum—a very different figure.

I also did not suggest that any prepayment gas-meters had been removed. Gas is still used for cooking; and, except where any difficulty has been raised about supplying the apparatus, no attempt has been made to introduce electricity for this purpose.

As the adviser to several combined gas and electricity undertakings, I am convinced that in the case of small consumers using a few lights for long hours, the most satisfactory and also the most economical arrangement at the present time—both for them and for the suppliers of gas and electricity—is to use electricity for lighting and gas for cooking.

Owing to the low running costs of an electricity undertaking compared with its standing charges, it costs very little more to supply a long hours' consumer than a short hours' one; while with gas the cost is much more in proportion to the actual quantity of gas consumed, and therefore to the hours during which light is used.

A. H. DYKES.

11, *Victoria Street, S.W., July* 28, 1914.

[If Mr. Dykes' figures are now correct, then his fear is well-founded that he was misreported, unless he himself made a slip when speaking, which is not an uncommon occurrence at meetings. If he will turn back to the "Electrician" for June 19 (p. 458) he will see these words under his name: "He instanced the work that had been done at Wimbledon by Mr. Tomlinson Lee, where 2000 houses, formerly using penny-in-the-slot gas-meters, had now been equipped with electric light, with an increase of more than £1000 in revenue to the Electricity Department." There now seems to have been two misstatements in the one reported sentence which Mr. Dykes does not appear to have thought fit to correct in the columns of the "Electrician." If this is the average of misstatements in the report, then it is a most unreliable one. There was ample time for correction before our comment was published on July 14; seeing that the (according to Mr. Dykes) muddled-up report appeared in the "Electrician" on June 19. Not until fourteen days had elapsed after our comment did Mr. Dykes write to us making correction, but still leaving standing uncorrected in the "Electrician" the misstatements attributed to him. However, now we find that the *average* revenue from 1000 houses is £1 per annum. Being an "average," this means that the receipts from some are above and from others below £1. Anyway, the average per house is 4·6d. per week, or about 0·65d. per day for an uncontrolled use of the lights—the candle power of which, their disposition in the dwellings, and the fixed charge made for them do not appear to have been stated by Mr. Dykes. Has our friend had the consumptions of these people measured in order to ascertain whether or not any of them are securing an "undue preference" over the flat-rate or other consumers in the matter of the payment they make per unit? It might be worth while investigating the point. Then it is seen that our correspondent "did not suggest that any prepayment gas-meters had been removed." The words in our electrical contemporary, it will be observed, were "*formerly* using penny-in-the-slot gas-meters"—the insinuation being that they are not doing so now. Touching our correspondent's reference to small long-hour consumers for lighting, they have, in not a few cases under fixed-price systems, been found to be such "long-hour" consumers that they are unprofitable. Fortunately Mr. Dykes is not the sole arbiter as to what is best for the small consumer. The pocket of the small consumer often determines the matter; and both the gas industry and an enormous majority of small householders are of opinion that a single account for lighting and cooking, with plenty of light of remarkably good quality, is best for their purposes. Investigation has shown how little difference there is in the gas accounts of small houses in which incandescent gas-lamps have been discarded for the electric light, and gas retained for cooking, for heating water on the top of the cooker for practically all household purposes—for meals, washing clothes, &c., bathing the children, a quiet bath for father or mother in the kitchen after the rest of the household has gone to bed, for scrubbing, &c.—and for ironing. It is really marvellous what some people in small houses (without bath rooms and a hot-water circulating system) manage to do with a gas-cooker. The small difference in the accounts where electric light has been adopted shows how little was previously paid for gas for lighting. With regard to the last paragraph of the letter, there are some gas engineers who, with the more modern systems of carbonizing, are (taking credit for residuals) putting gas into the holders to-day at 4d. or 5d. per 1000 cubic feet. What they are doing will be done by many others as time passes, and new plant is adopted and developed—greatly to the advantage of the consumers in those districts. We are quite convinced by Mr. Dykes' letter that he knows more about electricity supply than he does about gas supply and its uses.—ED. J.G.L.]

**A Question of Expediency.**—The Finance Committee of the Brighton Town Council have applied to the Lighting Committee for particulars as to the total cost of current supplied to the Corporation, as distinguished from current supplied to other consumers; lighting and power supplies being stated separately. They have also asked the Lighting Committee to frame their annual accounts so that this information may appear for the future. To both these requests the Lighting Committee have replied that they do not deem it expedient that the request should be complied with. As to the water-works accounts, the Finance Committee note that the profit balance for the year amounts to £4748, and that the Water Committee recommend that £4000 be transferred to the borough fund. Inasmuch as the amount included in the estimate for the borough rate as a contribution from the Water Committee was £4800, the Finance Committee think the whole of the profit balance should be transferred to the borough fund. The Finance Committee regret that the absence of detailed statistical information renders it difficult to consider the figures properly.

**Aldershot Gas, Water, and District Lighting Company.**—The Directors of this Company state that the total revenue during the half year ended June 30 was £37,453, and the expenditure £28,439, leaving a surplus of £9014. After providing for the dividends on the consolidated preference stock, and interest on the mortgage and debentures, dividends for the six months are recommended, less income-tax, at the rates of 6¼ per cent. per annum on the "A" stock, 4 7/10 per cent. per annum on the "B" stock (these rates being in accordance with the sliding-scale), and 5 per cent. per annum on the "C" consolidated stock. Exclusive of works and War Department supplies, the sales of gas have increased by 11·1 per cent.; and the revenue from water also shows an increase. The increased cost of coal and oil, together with the depressed coke and sulphate of ammonia markets, have (after allowing for the variation in the respective quantities used and made) adversely affected the revenue account under these heads. The electricity works are approaching completion; and it is anticipated that supplies will be available to the public for the coming autumn.

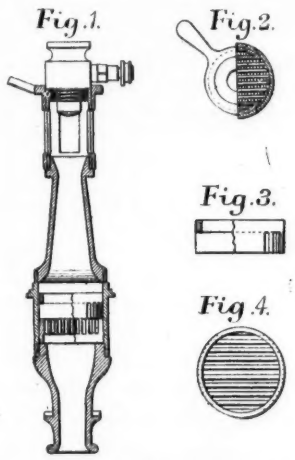
# REGISTER OF PATENTS.

## Bunsen Burner Mixing Tubes.

WATKINSON, J. G., of Farringdon Road, E.C., and FLETCHER, P. H., of Evesham.

No. 12,926; June 4, 1913.

According to this invention, a bunsen tube or burner is employed having an enlarged mixing-chamber at or near the nozzle (such as has been heretofore employed), and in the chamber are arranged an air and gas mixer and back-light preventer consisting of a ring having a series of parallel flat bars, or two or more rings arranged one above the other—the bars of one ring preferably crossing the bars of the other at a right angle.




**Watkinson and Fletcher's Bunsen Burner Mixing Tube.**

Fig. 1 shows in vertical section (partly in elevation) part of an inverted incandescent gas-burner with the air and gas mixer and back-light preventer constituting the invention. Fig. 2 is the burner tube, half in plan and half in horizontal section. Fig. 3 represents, partly in section and partly in elevation, one of the rings with parallel bars detached from the mixing tube. Fig. 4 is a plan of same.

The mixing tube of the burner has a slightly tapering form terminating at its lower end (adjacent to the mantle nozzle) in the enlarged mixing chamber having within it the air and gas mixer and back-light preventer "for ensuring a perfect intermingling of the gas and air before the same enters the nozzle," at the mouth of which the combustible mixture is burned as is usual. The mixer consists of a pair of rings each having a series of parallel bars preferably placed to cross at right angles, as shown in fig 2. Where the pressure of the gas is low, one ring only is employed; and in places where the air drawn into the burner is liable to be charged with an abnormal quantity of dust, and two rings are employed, the rings are arranged with their parallel bars or strips coincident.

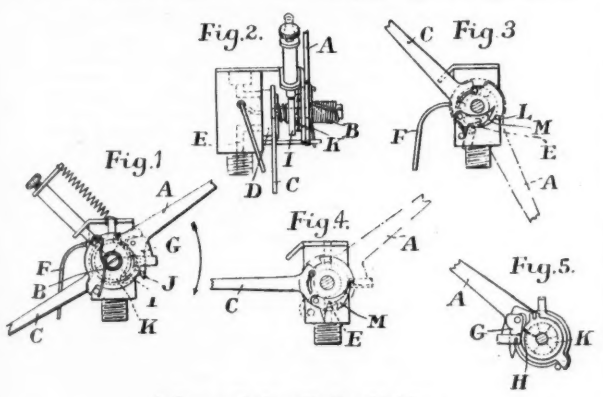
By such a construction of mixer a very efficient mixing of the air and gas is said to be ensured and back-lighting is rendered practically impossible.

## Automatic Gas-Lighters.

GAS-ZÜNDER G.M.B.H., of Berlin.

No. 14,757; June 26, 1913. Convention date, June 26, 1912.

These automatic lighters—chiefly intended for inverted incandescent gas-burners—have a friction wheel which under the action of a spring is released, on the opening of the gas-valve, by means of the member effecting such opening—the friction wheel being thereby shot round and striking sparks on a pin made of cerium iron or some other pyrophorous material, which sparks will either directly, or by the aid of auxiliary flames, ignite the gas emerging from the main gas-tube.




**A German Automatic Gas-Lighter.**

The ignition device makes it impossible for the gas supply to remain on, in case of failure of the ignition, in consequence of a coupling provided between the gas-valve and the turning member, which is automatically thrown out of gear in the igniting position, while in all the remaining positions a direct coupling between the valve and the turning member occurs, so that the gas-valve shuts itself automatically by the return movement of the turning member caused by the action of its spring.

Fig. 1 is a front view of the lighter; fig. 2, a view from the side; and figs. 3 and 4, views of the ignition device with part of the device removed.

The operation of the device is as follows: When the ignition lever A is pulled downwards from its position of rest and contrary to the action of the spring B, a pin engaging in the recess of lever C operates the lever, and with it also the rotary valve D, in the direction of the arrow. In consequence, first the main pipe E and then the ignition passage leading to the bye-pass F are made to communicate with the gas supply pipe through recesses, so that gas will commence to reach the burner. In the meantime, the ignition lever A has, by means of the pawl G, operated an intermediate disc against the action of its spring; the pawl H gliding over the teeth of the friction wheel I and the latter remaining at rest. At the lowest position of the ignition lever shown in fig. 3, the pawl G will be released by its pin, against which it strikes with its extension J. Under the action of the spring the intermediate disc will strike back; and its pawl H will strike against the adjacent tooth of the ratchet wheel K and whirl it round together with the friction wheel attached to it. Thereby "a powerful bundle of sparks" will be produced at the point of contact between the friction wheel and the ignition pin; and these sparks will first ignite the gas emerging from the bye-pass. The flame here produced will transfer ignition to the gas emerging from the orifice at the end of the bye-pass F, whence the gas emerging from the burner will be lighted.

If, now, the ignition lever A is released, it will return into its position of rest under the action of its spring; and during this stroke of the lever the pin will first move idly in the recess L (since the pawl M is raised) until it strikes against the edge of it. From this moment also the lever C, and with it the rotary valve D, will be operated. Owing to the play of the pin in the recess L, the valve D will not yet have reached its closing position, when the ignition lever has assumed its initial position. The valve, therefore, will remain in the intermediate position shown in fig. 4, at which the duct leading to the ignition bye-pass is closed, but the main duct E remains open. This position corresponds to the period during which the lamp will be burning. When the lamp is to be extinguished, the closing lever C is drawn into its lowest position, whereby the main gas-duct E is shut off.

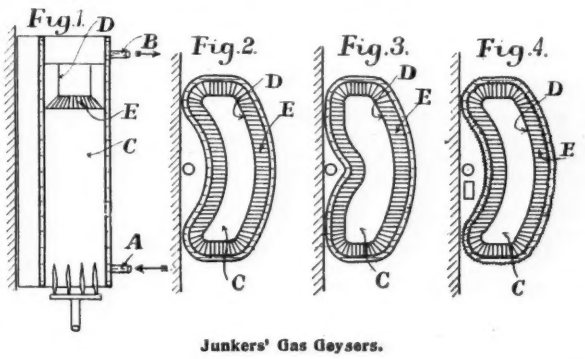
## Gas Water-Heating Apparatus.

JUNKERS, H., of Aachen, Germany.

No. 15,196; July 1, 1913. Convention date, July 5, 1912.

This invention relates to "geysers" of the type adapted to be suspended against a wall, and from which a continuous supply of water may be obtained from a container or pipes subjected to the action of the hot gases from a gas-burner arranged in the lower part of the apparatus.

According to the invention, it is proposed to overcome certain disadvantages in connection with some existing forms of water-heaters, and to reduce their cost by "constructing a heater which has great water and heating capacity, which projects but little from the wall, and has a very firm fastening and a neat appearance."




**Junkers' Gas Geysers.**

Fig. 1 shows in vertical section a water-heater suspended to the wall; and figs. 2, 3, and 4 show (in horizontal cross-section) examples of heaters of different configuration.

The heater consists of a double-walled chamber into which water is introduced at the lower end by the pipe A; while the heated water leaves by a pipe B at the upper end. The walls of the liquid containing chamber form a combustion chamber C for the gases of a burner of any desired construction. In the upper part of C is arranged a central body D surrounded by a heat receiving and transmitting device comprising a series of lamellæ E, which receive all the heat of the combustion gases passing through, and conduct the heat to the main chamber.

The heater shown in fig. 2 is of rectangular form; the front wall being convexly curved and the back wall concavely curved, the side walls being connected with the curved front and back walls by rounded corners. The gas and water supply pipes and a pipe for conducting away the waste gases pass up through the space between the back wall of the heater and the wall against which it is placed. The lamellæ E may consist of a number of plates arranged between the central body D and the inner wall of the heater.

In fig. 3 the front wall is convexly curved as in fig. 2; but the back wall is partially flat, and is provided at its centre with a recess for the several pipes as above stated. The inner construction is as before described.

In fig. 4 the outer wall of the liquid conducting chamber is formed with corrugations which "increase the stability and neat appearance

of the apparatus, so that the arrangement of a special decorative covering can be dispensed with." If at the same time the wall of the combustion chamber C, which also forms the inner wall of the liquid conducting chamber, is likewise formed of corrugated metal sheet, the bonds of this sheet can be utilized at the same time for holding the lamellæ of the heat transmitting device E.

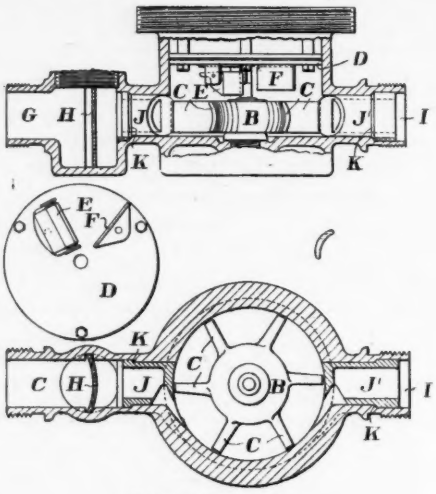
## Liquid Meters.

KENT, W. G., of High Holborn, W.C.

No. 17,106; July 25, 1913.

This liquid meter is of the type in which the flow of the liquid rotates a fan or rotor situated in a chamber in the pipe line, the rotation of the fan actuating a counter, with the object of providing a meter "in which the accuracy of the registration may be as great as possible over a wide range of flows.

It is known, says the patentee, that one of the factors tending to impair the accuracy of the registration is the swirl or eddy in the chamber, which varies with the flow. In order to render this swirl factor as nearly constant as possible, he pivots in the chamber a V-shaped spring-influenced or weighted baffle, so arranged that, as the flow increases, one of the sides of the V is opposed more and more to the current against the influence of the spring or weight. In such a meter, where the axes of the inlet and outlet are perpendicular to the axis of the fan, he forms the blades of the fan with the surfaces against which the liquid impinges concave in cross sections parallel to the axis, instead of plane or concave in sections perpendicular to the axis as heretofore. This form of blade, it is claimed, tends to concentrate the flow to the central plane of the fan and to impede the escape of the liquid at the sides of the fan.




Kent's Liquid Meter.

Into the inlet and outlet pipes are inserted (as has before been proposed) thimbles or plugs; and according to this invention each of these is formed cylindrical in general shape, and with a shoulder upon it fitting against a shoulder in the pipe in which it is inserted. The end of the plug is partly closed by a diaphragm which conforms on its exterior to the cylindrical interior of the chamber. Part of the cylindrical portion of both plugs and part of the diaphragms are cut away to form orifices, and parts also of the cylindrical interior surface of the chamber are cut away, so as to direct on the inlet side the incoming liquid round the cylindrical wall of the chamber, and on the outlet side to allow the liquid between the blades of the fan to find its way readily into the outlet plug.

In the casing of the meter is journaled a rotor B, having blades C formed with the concave surfaces on which the liquid impinges. On the bottom plate D of the counter train is pivoted a V-shaped baffle, the side E of which is weighted so that, when no liquid is passing, it hangs (as shown) with one side approximately horizontal. F is a fixed baffle depending from the plate D. As the flow increases, the baffle is turned on its pivot by the swirl of the liquid above the rotor, so that one side is inclined more and more to the horizontal to lessen the swirl. In the inlet G, in which is a strainer H, and in the outlet I are fitted thimbles J J¹—cylindrical in general shape and with a shoulder K fitting against a shoulder in the pipe. The inner end of the thimbles are partly closed by diaphragms the inner sides of which are cylindrical, conforming with the interior surface of the casing, parts of which are cut away as shown.

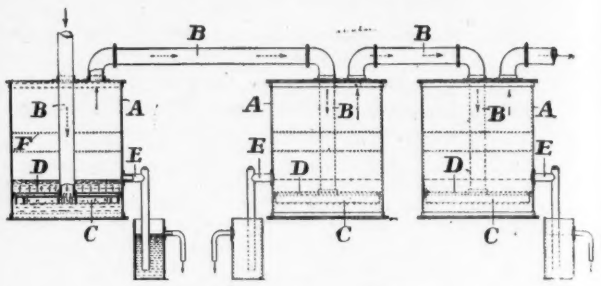
## Recovering Tar from Hot Distillation Gases.

STROMMENGER, W., of Cologne.

No. 19,955; Sept. 3, 1913. Convention date, Sept. 28, 1912.

According to this invention the tar is removed from gases by passing them through separate washers containing only a viscid washing medium—such as tar, tar oil, or other heavy liquid—and keeping steady the surfaces of the medium "in order that the rising gas bubbles may be squashed flat by the resistance of the surface tension to their escape."

Before passing through the washers, the gases should preferably have been preliminarily freed from tar, the patentee remarks, by the usual washing in the hydraulic main—the purpose of this washing, according to the invention, being "to remove from the gases the last vestiges of tar, as is required in the direct obtaining of ammonium sulphate."




Strommenger's Tar-Recovery Plant.

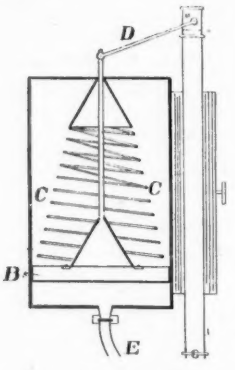
The invention is diagrammatically illustrated. Gas is supplied to the washing tanks A containing tar, through pipes B. It first passes into distributors C, which are preferably "spider shaped." The distributors are arranged inside the washing liquid, and above them is arranged a coarse perforated plate D (also within the washing liquid), "the size of holes or mesh of which is such that the rising gas bubbles can pass through without being compressed, and no reduction or choking by tar can take place." In this way the surface of the liquid is guarded from agitation. To this end, "as shown in practice, it is sufficient to have holes of (say) 10 mm." The level of the washing liquid is maintained at a constant height by overflows E. The parts F are separators for removing drops of liquid entrained by the gas.

## Operating Gas-Valves.

ROBINSON, S., of Farnborough, Hants.

No. 23,365; Oct. 16, 1913.

This apparatus, in an automatic manner, performs the work of lighting and extinguishing gas-burners of the type comprising a small cylinder in which is arranged a moveable piston B with a piston-rod extension, connected to a branch piece, and which operates in both directions a lever tap and cock operating within, or on, a gas service supply pipe. The piston within the cylinder is free, and is made to move in one direction by an increase of pressure within the cylinder, from a separate pipe connected to a main or pipe conveying either air, gas, or water under pressure; and when the piston is moved in one direction, the lever-tap and gas-cock are automatically turned to allow gas to flow to any gas-burner.




Robinson's Gas-Burner Operator.

A spiral spring C is arranged in the cylinder, so that when the piston is moved to open the tap on the branch piece D, the spring is placed in a state of compression through the pipe E, and when the pressure is reduced or released, the energy stored in the spring while under compression is allowed to come into play, with the result of reversing the first movement of the cock, and automatically closing-down the flow of gas to the burner. The piston is provided with a conical valve-like member, adapted when the piston is fully raised to engage a conical seat on the cylinder to make an air-tight joint when the piston is fully raised.

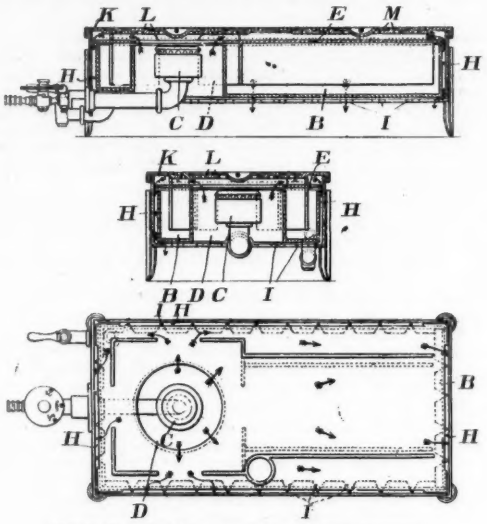
## Gas Cooking-Stove and Water-Heater.

HIPP, C. A., of Stuttgart, Germany.

No. 9875; April 21, 1914. Convention date, April 21, 1913.

The patentee proposes to place the boiler in an enclosed casing with space between it and the boiler all round; the top being formed as a removable plate, from the underside of which heating ribs extend into the boiler, and from its upper side guiding ribs extend up to the outer casing, for the direction of the heated gases. The heated gases give up their heat partly to the ribbed plate, and through its lower ribs direct to the water, and partly to the walls of the water container, so that the latter is heated on all sides, "whereby is produced a very high degree of efficiency and the utmost possible utilization of the heating effect of the gases." A further advantage of the arrangement is said to consist

in that, "in consequence of the suitable guidance of the heated gases, it is possible to cook with a completely covered burner tube and closed covering plate, without the flame striking-back."




**Hipp's Gas Cooking-Stove and Water-Heater.**

The illustration shows vertical longitudinal and transverse sections; also a plan view with the covering plate removed.

The stove frame is closed at the sides and open above and below; and in it a water-boiler B is placed so as to surround the burner C. The burner tube D is open above and below; and the cover of the boiler is formed by the ribbed plate E, which is provided at both sides with ribs—the upper ribs are placed upon the upper side of the plate E serving for the guidance of the heated gases, while those on the under side project as deeply as possible into the boiler in order to act as conductors of the heat. The ribs are perforated at various places around the burner tube in order to allow the heated gases striking them to escape, so that they pass into the free space H left all round between B and the side of the frame, and out of this space they can escape at the edges of the frame through perforations I. The frame is covered above by the removable plate K, and, in addition to the closable cooking opening L, possesses closable openings M.

If the water receptacle and ribbed plate be removed from the frame, then the latter can be utilized with the covering plate as an ordinary gas-stove without necessitating any constructional alterations in the gas and water supply.

## APPLICATIONS FOR LETTERS PATENT.

17,117.—Toogood, H. J., and Dempster, R., and Sons, Ltd., "Charging and discharging gas-retorts." July 20.
17,169.—White, C., "Distillation of carbonaceous materials." July 20.
17,170.—Lamkin, A. E., "Control of gas." July 20.
17,199.—Prestage, E., "Gas-compressors." July 20.
17,222.—Veenema, C., "Mantle support." July 21.
17,236.—Walch, W., "Cooling coke." July 21.
17,350.—Crowther, N., "Couplings for tubing." July 22.
17,396.—Lamkin, A. E., "Gas-valves." July 22.
17,448.—Harsant, H., "Compressing gas." July 23.
17,475.—Duvieusart, F., "Recovery of ammonia." July 23.
17,502.—Duckham, A. M'D., "Manufacture of coke." July 23.
17,539.—Abbott, J. A., "Apparatus heated by gas." July 24.
17,569.—Svenska Aktiebolaget Gasaccumulator, "Incandescent gas flash-light apparatus." July 24.
17,646.—Lederer, A , "Electric gas-lamps." July 25.
17,667.—Duckham, A. M'D., "Vertical retorts." July 25.
17,668. — Duckham, A. M'D., "Discharging vertical retorts." July 25.

**A New Water-Main for Cardiff.**—An inquiry on behalf of the Local Government Board has been held by Mr. P. S. Crosthwaite into an application by the Cardiff Corporation for their sanction to borrow £50,497 for a new trunk water service main from Lisvane to the Heath filter-beds, and thence to the city, and for additional filtering appliances and storage facilities. It was explained that the existing main had become inadequate for the needs of the consumers. There was no opposition to the application, which was supported by Alderman C. H. Bird, the Chairman of the Water Committee.

**Visit to the Wigan Water-Works.**—Members of the Wigan branch of the Municipal Officers' Association recently paid a visit to the water-works, in pursuance of the desire on their part to inspect all the local municipal undertakings. On their arrival at the pumping station at Boar's Head, they were met by Mr. Hughes (the Water Engineer) and his staff, who explained the different processes of treatment. The inspection of the reservoirs, filter-beds, &c., at Worthington was followed by attention to other features of the undertaking. The Town Clerk (who is also the President of the Association) said the visit had been an unqualified success; and he proposed a vote of thanks to the Chairman (Alderman Dickenson) and members of the Water Committee, for permitting it. Thanks were also accorded to the Water Engineer and all others whose efforts had contributed to the success of the function.

# PARLIAMENTARY INTELLIGENCE.

## HOUSE OF LORDS.

### Bills Royal Assented.

The following Bills received the Royal Assent.
Gas and Water Provisional Orders (No. 1).
Gas and Water Provisional Orders (No. 2).
Local Government Provisional Orders (Gas).
Brentford Gas.
Chelmsford Gas.
Bedwas and Machen Urban District Council.
Market Rasen Water.
Hightown Gas and Electricity.
Longwood and Slaithwaite Gas.
Deal and Walmer Gas and Electricity.
Newport Corporation.
Skegness Gas.
Whitwell and District Gas.
Ellesmere Port and Whitby Urban District Council.
Liverpool Gas.
South Suburban Gas.
Reading Corporation.
Leyland Gas.
Tees Valley Water.
Middlesbrough Corporation.

The following progress has been made with Private Bills:—

The Walsall Corporation Bill, Isle of Thanet Gas Bill, St. Anne's-on-the-Sea Improvement Bill, Hayward's Heath Gas Bill, City of London (Various Powers) Bill, and Ossett Corporation Bill were reported with amendments.

The Wadhurst and District Gas Bill, Southend Gas Bill, Gas Provisional Orders (No. 3) Bill, Gas Provisional Order (No. 2) Bill, Riddings District Gas Bill, and Northwich Urban District Council Bill were read the third time and passed.

The Commons' amendments to the Liverpool Gas Company Bill, Ellesmere Port and Whitby Urban District Council Bill, and Reading Corporation Bill were agreed to.

## HOUSE OF COMMONS.

The Weston-super-Mare Urban District Council Bill was read a second time and committed.

The Manchester Corporation Bill and Porthcawl Urban District Council Bill were reported with amendments.

The Gas Light and Coke Company Bill, Reading Corporation Bill, Skegness Urban District Council Bill, Leighton Buzzard Gas Bill, and Edenbridge Gas Bill were read the third time and passed.

The Lords' amendments to the South Suburban Gas Bill, Leyland Gas Bill, Tees Valley Water Bill, Middlesbrough Corporation Bill, Southend Gas Bill, Wadhurst and District Gas Bill, Gas Provisional Orders (No. 3) Bill, Gas Provisional Order (No. 2) Bill, Northwich Urban District Council Bill, and Riddings Gas Bill were agreed to.

Notice was given for the rejection, on its consideration, of the Leighton Buzzard Gas Bill, as amended.

### Water Undertakings Returns.

A return relating to the water undertakings of England and Wales, ordered on Nov. 24, 1910, on the motion of Mr. Herbert Lewis, was presented in the Lower House, and ordered to be printed.

## ISLE OF THANET GAS BILL.

This Bill was last Tuesday before the Unopposed Bills Committee of the House of Lords.

Mr. E. C. Cooper (Messrs. R. W. Cooper and Sons, Parliamentary Agents) stated that there were no outstanding points in the Bill, except one in regard to a report by the Local Government Board concerning the clause which gives the Company power to make a charge for reading a meter at the request of the consumer at times other than the Company's periodical readings. This matter was discussed before the House of Commons Committee, and the clause was allowed after evidence was heard. Mr. Cooper now informed the Committee that the report of the Local Government Board called attention to the clause, but he had made no alteration in it.

The Lord Chairman allowed the clause to remain in the Bill. It reads as follows:—

> The Company may levy and recover such charges as they think fit for taking the reading of any meter fixed in a house which is either in whole or in part let furnished, at the request of, and for the convenience of, consumers at times other than the Company's periodical readings, such charges not to exceed the sum of sixpence per reading.

Since the Bill was before the House of Commons, a number of new clauses have been added, which are given below. It is unnecessary to repeat the clause with regard to calorific testing, as the figures—namely, 540 B.Th.U., with a margin of 7½ per cent.—are identical with those in the Gas Light and Coke Company's Bill.

### New Clause 23.

> The existing prescribed testing-place for the purposes of the Gas-Works Clauses Act, 1871, shall be the prescribed testing-place for the purposes of this Act until the Company shall commence to manufacture, or shall obtain, gas for supply in the borough of

Margate at, or from, any works other than the works of the Company existing at the date of the passing of this Act. So soon as the Company shall have so commenced to manufacture or obtain gas, they shall provide a testing-place in such position in the said borough as may be reasonably approved by the Corporation for the purpose of testing gas supplied for use in the said borough from any works, whether within or beyond the borough, and thereafter such last-mentioned testing-place shall be the prescribed testing-place for the purposes of this Act.

**New Clause 27.**

(1) Any gas examiner appointed by the Corporation may, at the prescribed testing-place, in such manner, and by means of a flat-flame burner of such pattern as may for the time being be prescribed by the Gas Referees under section 5 [as to testing for calorific power, sulphur impurities, and illuminating power with flat-flame burner] of the London Gas Act, 1905, make testings of such gas for the purpose of ascertaining the illuminating power thereof when consumed in such burner.

(2) The gas examiner shall forthwith deliver to the Corporation and to the Company a report of the result of each testing conducted by him under the provisions of this section.

(3) The Company shall not be liable to forfeitures or penalties in respect of testings made under the provisions of this section.

(4) The Company shall provide and maintain at such testing-place as aforesaid such apparatus and materials as may for the time being be prescribed by the Gas Referees under the said section 5 of the London Gas Act, 1905, for use for the purpose of testings for ascertaining the illuminating power of the gas supplied by the companies referred to in the said Act as ascertained by means of a flat-flame burner, and shall afford to the gas examiner all facilities for the proper execution of his duty under this section.

(5) The gas examiner shall make, in accordance with the provisions of this section, testings at such testing-place as aforesaid on such days (exclusive of Sundays) as the Corporation shall direct.

(6) The Corporation shall give to the Company not less than six hours' notice in writing of their intention to make a testing under the provisions of this section of the gas supplied by the Company, and shall state in such notice the day on which, and the hour at which, they intend to make such testing.

(7) The provisions of section 31 of the Gas-Works Clauses Act, 1871, shall apply to any testing made under this section.

**New Clause 56a.**

Nothing in this Act shall except the Company or their undertaking from the provisions of any General Act relating to the supply of gas which may be passed in this or any future session of Parliament.

## PORTHCAWL URBAN DISTRICT COUNCIL BILL.

### HOUSE OF COMMONS.—LOCAL LEGISLATION COMMITTEE.

**Wednesday, July 29.**

The object of this Bill is to enable the Porthcawl Urban District Council to purchase the undertaking of the Porthcawl Gaslight and Coke Company. The measure has already passed the House of Lords [see "JOURNAL," May 12, p. 445].

Mr. F. N. KEEN appeared for the promoters. There were no opponents.

Mr. *T. G. Jones*, the Chairman of the Urban District Council, and President of the local Ratepayers' Association, said that Part II. of the Bill proposed to purchase the gas undertaking in Porthcawl, which was at present carried on by a Company. Until last year the Company was a non-statutory concern; but at that time they obtained statutory powers to supply throughout Porthcawl, and also the parishes of Sker, Kenfig, Pyle, Tythegston Higher, and Tythegston Lower. The Urban District Council of Porthcawl opposed the Bill, and obtained a purchase clause, which provided that if they promoted a purchase Bill in the present session of Parliament the Company were not to oppose except on clauses; that the price to be paid was to be fixed by arbitration; and that the Urban District Council should be allowed to purchase the Company on the basis of a non-statutory concern. The price of gas in Porthcawl at one time was 4s. 9d. per 1000 cubic feet; but it had been reduced to 4s. 2d., with a discount of 6d.—making a net charge of 3s. 8d. The Company had found the undertaking very remunerative; a 10 per cent. dividend having been paid, and the works having been improved out of revenue. The maximum price it was proposed to adopt was 4s.

In answer to Mr. RHODES, of the Local Government Board, witness stated that the Council had given the ratepayers estimates of what they expected the undertaking would yield.

The CHAIRMAN (Mr. Gardner) pointed out that the Council could hardly give a proper estimate until the price to be paid for the undertaking was fixed.

*Witness* replied that Mr. Frank Jones, their Consulting Engineer, had advised the Council with regard to the gas undertaking, and had estimated the value of the works.

Mr. RHODES pressed witness to give figures concerning the commercial success of the undertaking in the hands of the Council; but it was pointed out by Counsel that, having in view the fact that the matter must come before an arbitrator, it would not be fair to state figures which might be prejudicial to the promoters in this connection.

*Witness*, however, said that a profit of £600 per annum was anticipated.

In reply to Mr. JONATHAN SAMUEL (a member of the Committee), witness said that a penny rate in Porthcawl amounted to £87.

Continuing, witness said that the price it was proposed to charge outside the urban district was 6d. per 1000 cubic feet higher than inside, because the parishes included in the area of supply were four or five miles off, and if a supply was given a considerable length of main would have to be laid.

Mr. SAMUEL asked whether these parishes were outside the Porthcawl district.

*Witness* said they were; but the local authorities in whose districts they were did not oppose. There was no supply in these parishes at present; oil being used as an illuminant.

Mr. *Frank Jones*, speaking with regard to clause 19, which provides that the price in the outside districts should be 6d. per 1000 cubic feet more than in Porthcawl, said the difference of 6d. was quite a usual one. It was not only the extra cost of laying mains which had to be considered, but also the extra cost of getting backwards and forwards for collection and repairs.

The CHAIRMAN suggested that the price in these districts might be kept high in order that outside districts should pay more towards the relief of rates in Porthcawl.

Mr. KEEN pointed out that the price could not exceed 6d. more than in Porthcawl.

With regard to clause 22, dealing with the arrangements as to testing for calorific value, Counsel said that it was provided in the Company's Act last year that the Council should have a calorific test and not an illuminating test. It was also provided that the gas should be (tested under the conditions prescribed by the Metropolitan Gas Referees) of a standard calorific value of 540 B.Th.U., and that if the gas was below 475 B.Th.U. to the extent of 28 B.Th.U., the examiner should make a testing on each of the two following days; the average of the three testings being the average value of the gas, and the Council should not be penalized unless the quality was below 447 B.Th.U. The Council were asking, however, that this should be altered, as set out in clause 22 of the present Bill, which reads as follows:

> The following provisions shall apply with respect to the testing for calorific value of the gas supplied by the Council:
>
> (1) Not more than one testing for calorific value shall be made on any one day (reckoned from midnight to midnight) except that in the event of the calorific value being on any testing ascertained to be below 475 B.Th.U., the gas examiner shall forthwith give notice thereof to the Council, and a second testing shall be made at an interval of not less than one hour from the time of making the first testing at that testing-place, and the average of the two testings shall be deemed to be the calorific value of the gas on that day.
>
> (2) The Council may, if they think fit, on each occasion of the testing of gas under the provisions of this section, be represented by some officer, who shall not interfere in the testing.
>
> (3) The gas examiner shall forthwith give notice to the Council at their office of any defect of calorific value ascertained by him on any testing of the gas.
>
> (4) Section 12 of the Gas-Works Clauses Act, 1871, and so much of Schedule A of that Act as relates to the apparatus and mode of testing illuminating power, shall not apply to the Council and their gas undertaking, and sections 28 and 33, both inclusive, of the said Act in their application to the Council and their gas undertaking shall be construed as if calorific value were therein referred to instead of illuminating power.

Therefore, said Counsel, instead of having three tests on three separate days, it was proposed that the tests shall be taken on the one day; and, subject to this, the Council asked for a standard calorific value of 475 B.Th.U. The decision on the Gas Light and Coke Company's Bill was that 540 B.Th.U. should be the nominal standard, and that the Company were to be penalized if the gas was deficient beyond 7½ per cent.—namely, 449½ B.Th.U. Porthcawl, however, was in a very different position to the Gas Light and Coke Company. In the first place, the undertaking was very much smaller; secondly, Porthcawl was near the South Wales coalfield, which was a steam coalfield. There was a certain amount of coal available for gas-making purposes. It was not, however, a good gas-making coal; and if a high standard was put upon a small undertaking in South Wales it would involve their going further afield to get coal.

Mr. RHODES remarked that surely this arose on the price and not the quality.

Mr. KEEN said that it arose on the quality as well, because if the arrangements made were such as to drive the undertaking to get coal from Durham or Yorkshire, this involved putting a higher price upon the locality, which was not a sound principle. For both these reasons he suggested that Porthcawl should not be judged on the same basis as the Gas Light and Coke Company. What the Council were trying to do was to put the gas consumer in a better position than would have been the case had the undertaking been in the hands of the Company.

Mr. RHODES asked why, instead of having three tests on three consecutive days, there should be two tests on the same day.

Mr. KEEN said this was an advantage to the gas consumers, inasmuch as, if the gas was found to be deficient, it could not be brought up to a higher standard so easily as could be done in three days, in order to defeat the object of the test. Counsel also pointed out that up to 1913 the Company was a non-statutory concern, and therefore the calorific standard was being imposed for the first time; so that the argument that the consumer was losing something was not available. He also referred to the case of the Bedwas and Machen District Council, who promoted a Bill this session. The clauses there were absolutely word for word the same as he was proposing in the present case.

Mr. RHODES said the question was whether the figure of 7½ per cent. should be inserted. These calorific value clauses had been considered to some extent as a whole this year, and several points in particular had been determined. One was as to the normal standard, which was fixed at 540 B.Th.U. Another point was whether there should be two or three testings; and two had been settled upon. The third point was as to what should be the margin allowed before an undertaking became penalized; and it was decided that it should be 7½ per cent. Counsel referred to a number of Bills where the figures in the Gas Light and Coke Company's Bill had been adopted.

Mr. KEEN suggested that perhaps in these Bills it was agreed to

accept the Gas Light and Coke Company's figures before they were settled, as was the case in connection with the Skegness Bill.

Mr. RHODES said if this question had been considered by the House of Lords he had nothing more to say. If it had not, then he asked that the figure should be altered to 7½ per cent.

Mr. LEES (Messrs. Lees and Co., Parliamentary Agents) said that after the Bills had been considered in the House of Lords the question was raised as to what was to be done in Porthcawl; and in consequence of the fact that the Company never had a standard at all, but came to Parliament last year for the first time and obtained this calorific standard, and also because it was a very small undertaking, the Lord Chairman allowed the clause to stand as at present in the Bill. He had altered the three days' testing to one day's testing, and increased the penalties from 10s. if the deficiency was less than 14 B.Th.U., £1 if between 14 and 28, and £2 for each complete 28 B.Th.U., to £2, £5, and £10 respectively, as was done in the Bedwas and Machen Bill. This was an entirely new undertaking, and under the special circumstances of the two cases he had thought this would be sufficient.

Mr. *Jones* said that he was perfectly sure a small undertaking would not be able to keep up to a standard of 499½ B.Th.U. without considerable expense. They would have to spend money to enrich the gas.

The CHAIRMAN said the Committee would allow the clause.

Mr. KEEN, speaking with regard to borrowing powers and the repayment of loans, said that the period for repayment of the sum to be borrowed for the purchase of the undertaking had been reduced from 40 years to 35 years.

Mr. RHODES asked if the works were in good condition.

Mr. *Jones* said they were. Taking this into consideration, 35 years was a reasonable period.

Mr. KEEN, referring to further sums to be borrowed in connection with the gas undertaking, said that the period for repaying the £10,000 required for the improvement and extension of the undertaking had been reduced from 40 to 25 years, and that for the repayment of the £1000 working capital was fixed at ten years.

This concluded consideration of the gas clauses.

# LEGAL INTELLIGENCE.

## DISCS FOR PENNIES IN PREPAYMENT METERS.

### Sequel to the Manchester Appeal Case.

At the Manchester City Police Court on Monday of last week, a married woman named Margaret Adelaide Hargreaves, otherwise Smith, was summoned before the Stipendiary (Mr. Edgar Brierley) for non-payment of the costs incurred in the appeal of the defendant against the decision of the Stipendiary convicting her for fraudulently stealing 222 cubic feet of gas on divers dates between Jan. 9 and April 17. The Police Court proceedings were reported in the "JOURNAL" for May 5, p. 366; and the appeal at Quarter Sessions on p. 45 of that dated July 7. It will, perhaps, be remembered that defendant was originally fined 10s. and costs for stealing the gas by using tokens or discs in lieu of pennies in automatic penny-in-the slot meters; and she was prosecuted at the instance of Mr. Robert Hewitt, a Gas Inspector to the Corporation. Her notice of appeal was held by the learned Recorder (Mr. A. J. Atkin, K.C.) to be bad, inasmuch as she served it on (1) the Town Clerk of Manchester, and (2) the Clerk to the City Justices—instead of upon Mr. Robert Hewitt, who laid the information. The case was, accordingly dismissed, with costs against the appellant.

Mr. A. F. I. PICKFORD (of the Town Clerk's Department), in opening the case, said this was a judgment summons calling upon the defendant to appear at the Court that day to be examined on oath as to her means to satisfy the sum of £19 13s. 11d. due to the Corporation under an order of Quarter Sessions recently held at Manchester. The sum in question represented the costs of the Corporation on an appeal by the defendant against a conviction for stealing gas. The appeal was dismissed with costs against Mrs. Hargreaves. The money for costs was not paid to the Clerk of the Peace (Mr. Ogden); and accordingly a warrant of distress was issued on July 17. There were not sufficient goods belonging to the defendant to satisfy the claim, and it was, therefore, decided to recover the costs as a civil debt, as provided by the Act. The matter now came before the Court in the shape of a judgment summons calling upon the defendant to be examined touching her means, and to show cause why she should not be committed to prison for contempt.

The STIPENDIARY asked under what section the present proceedings were instituted. He thought the question of the recovery of costs an important one.

Mr. PICKFORD replied that he relied upon section 27 of the Summary Jurisdiction Act of 1848 (p. 98 in the 1914 edition of "Stone's Justices' Manual"). This, he thought, covered the case, because the warrant had been returned on the ground of insufficient goods.

The STIPENDIARY: Then the warrant of distress has been returned "No goods," and now you have taken out a judgment summons.

EVIDENCE AS TO MEANS.

In answer to the prosecuting solicitor, the defendant said she lived with her father, Harry Smith, in Chorlton Road, Manchester, as her husband was abroad—in Canada, as a farmer. He had a small farm of his own. She had some private property of her own, and some Consols out of her grandfather's estate; but it was mortgaged now. It was bringing in about £60 per year at one time. It is now bringing in about £12 a year. She mortgaged part of it for £500 in 1908 and the interest came to about £32 per annum. In addition to the £32 she paid for mortgage interest there was £10 or £14 deducted in connection with a certain trust deed.

Mr. PICKFORD: Is the whole of your income £60, less £46?

*Witness:* It is, sir.

Mr. PICKFORD: Is this [handing up a letter] your father's hand writing?—Yes.

Is this true? [reading]: "I also enclose on behalf of my daughter, Mrs. Margaret Hargreaves, who is over in England on a health visit, by doctor's orders, from Canada, where her husband is a very extensive farmer . . . ?"—It depends what he means by "very extensive." It would be called a small farm there, but extensive as applied to the size of farms in this country.

"And who is in receipt of an income, in her own right, from property in this country, sufficient to remove her from the temptation of stealing gas, . . . ," said Mr. Pickford again [quoting from the letter]. Is that right, too?

*Witness:* I think so. I never stole any gas.

And do you seriously suggest that your net income is now about £13 or £14?—Yes.

Your father's letter dated May 24 says: "Who is in receipt of an income," not who "was" in receipt.—That is perfectly true.

Would that lead people to think you were only worth £13 or £14 a year?—Well, I don't know.

Would it suggest that you were in receipt of an income sufficient to support yourself without the assistance of anyone else?—I suppose it would.

ACTION AGAINST THE CORPORATION.

Is it true that you have started an action against the Manchester Corporation? Who is paying for that?—Myself.

Out of your £13 or £14 per year?—Yes.

It is going to take a long time, then, to get together sufficient money to sue the Corporation?—Perhaps you think so; but I don't. The same firm of solicitors are acting for me in the matter as in this.

Mr. NELSON briefly examined defendant with regard to her present means. She did not know what amount of Consols had been sold.

The STIPENDIARY expressed surprise at this answer, and remarked that from the businesslike way the defendant was conducting her case he hardly thought she would be so lax in such an important matter.

*Defendant* explained that the estate consisted of several relatives who were scattered up and down the country. The trustee of the estate sent her what was due to her from time to time. She really had no knowledge of the management of the estate.

The STIPENDIARY said he presumed the defendant meant she did not know what the capital was.

*Witness* replied in the affirmative. She was only entitled to an interest in it for life; that was why the insurance premium of £10 or £14 was necessary. Her income was at present only very small, and she was living with her father as his guest.

The STIPENDIARY [to defendant]: I do not quite understand how you will go on with your proceedings against the Corporation if you have so little capital; neither do I see any reason why you should not pay your debts before you do so.

Mr. NELSON submitted that defendant's advisers were so satisfied that there was a case against the Corporation that it was proposed to have the matter cleared up very shortly in the Courts. He submitted in the present case that the Corporation had not proved that since the order of Quarter Sessions was made out, the defendant had been in receipt of, or was in receipt of, sufficient funds to pay the costs. This was a most important matter, and payment could only be enforced in the present circumstances if it was shown that she had had the money and had not paid it over. The position of the husband of the defendant was altogether irrelevant in the matter. There were many reasons why the order should not be enforced—one of them being that the defendant was bringing an action against the Manchester Corporation for malicious prosecution. It was ridiculous to interpret this as a sign of wealth.

STIPENDIARY'S DECISION.

In the end,

The STIPENDIARY said he was unable to make the order asked for, on the ground that the Corporation had not produced evidence that the defendant had had the means to pay.

Mr. PICKFORD intimated that in that case they would proceed by way of enforcing the recognizances.

### At the Quarter Sessions.

At the commencement of the Manchester Quarter Sessions last Wednesday, Mr. WINGATE SAUL made an application, on behalf of the Manchester Corporation, for the estreatment of the sureties of Margaret Adelaide Hargreaves, Harry Smith, and Joseph Hadfield, entered into to prosecute the appeals which failed at the last sessions [see "JOURNAL," May 5, p. 366]. He explained that the appeal was against a conviction in the Police Court for abstracting gas from a penny-in-the-slot meter by means of metal discs; and the appeal was dismissed with costs. The costs had not been paid. The appellants, as they were required to do, entered into recognizances, with the usual sureties before the Magistrates, to prosecute the appeal, to abide by the order of the Court of Quarter Sessions, and pay the costs. The latter amounted to £19 13s. 11d.; and the Court ordered that they should be paid within seven days. He, therefore, now applied that the recognizances entered into be estreated.

Mr. E. T. NELSON (on behalf of Hargreaves and Smith) suggested that the hearing be left over until the end of the sessions.

Mr. SAUL said the appellants had not treated the matter at all seriously. Originally there were two summonses—viz., one for unlawfully and fraudulently abstracting, consuming, and using 222 cubic feet of gas, and the other for having feloniously stolen the same quantity of gas. There was a conviction in regard to one of the summonses, and the other summons was not proceeded with. Hargreaves had now issued a writ for malicious prosecution, although the Corporation had succeeded in securing a conviction. Appellants had not treated the matter properly from the outset; and he therefore urged that the recognizances should be estreated.

Mr. NELSON: The charge of stealing gas was dismissed by the Stipendiary.

The RECORDER: The conviction stated in the recognizances is for fraudulently abstracting the gas. I do not know what the defence

was, but it seems clear to me that if "any person abstracts, uses, and consumes"——

Mr. NELSON: This is not the time, your Honour, to go into the case again; but the parties were justified in believing that they had a good case. Evidence which ought to have been given in the Court below was not given. It was an improper conviction; and I venture to say your Honour would think so too if you had all the parts of the case.

The RECORDER: All I am asked to do at present is to order the estreatment of these recognizances. I think that Hargreaves and her two sureties are treating the Court with contempt.

By direction of the Recorder, Hargreaves was put in the witness-box and questioned by His Honour.

"You know there is nearly £20 owing by you for costs?" he asked.

"Yes," she replied, adding that she had been in negotiation with some people to advance a certain amount of her income. The negotiations, however, would not be completed for another fortnight.

The RECORDER: But you entered into recognizances for £60, and now you can't find £19. You held yourself out as a responsible person up to £60; but I suppose the truth of the matter is that you were worth about sixty pence at that time.

Answering further questions, Hargreaves said that she and her father (Smith) had tried to get the money but had failed.

Smith told the Recorder that, when he entered into his recognizances he thought he was worth £30. He thought so now; but it was not quite convenient to handle the money. [A laugh.] His daughter had an interest in a moderately big estate—to the extent of something like £1200—and she was negotiating for an advance of £600. The negotiations might be concluded any day.

The RECORDER: Unless this money is found at once I shall order the recognizances to be estreated, and you will be sold up. Addressing Hargreaves and Smith, he said they were faced with the prospect of having to find £60, because the £20 costs had not been paid. The utmost he would do would be to adjourn the application until Friday morning, and unless the money was forthcoming then, or some definite undertaking given which would satisfy him, the recognizances would be at once estreated.

Mr. HANS HAMILTON (for Mr. Saul) suggested that, having regard to the fact that Smith said his daughter was interested in an estate worth £1200, would his Honour order the £20 to be paid on Friday?

The RECORDER: There must be something definite on Friday. I shall take no promises. The money must be here.

### The Costs Paid.

At Friday's sitting of the Court,

Mr. WINGATE SAUL (for the Corporation) applied to withdraw his application to estreat the recognizances, stating that the amount of the taxed costs of the appeal had now been paid in full.

His HONOUR assented.

---

**Belfast Water Supply.**—The Works Committee of the Belfast City and District Water Commissioners reported at last week's meeting that it had been arranged that Mr. Edward Sandeman and Mr. James Watson, members of the Institution of Civil Engineers, should furnish a joint report on the plans prepared by the Commissioners' Engineer for the construction of the new storage reservoir in the Silent Valley, Mourne Mountains (co. Down). It was also intimated that Professor Frankland had furnished a report on the quality of the water supply, declaring it to be "unusually satisfactory."

**Cost of the Leeds Strike.**—At the time of the issue of the report of the Special Committee on the Leeds strike, it was decided that a return showing the cost of the dispute should be made when all liabilities had been discharged. It is now stated that the total special expenditure in connection with the strike was as follows: Sums expended by the Special Committee, £12,333; sums disbursed by the Watch Committee to maintain the peace of the city, £22,771; total, £35,104. This amount, it is pointed out, is much smaller than the estimates which have been made from time to time by speakers both in the City Council and outside. It has, however, to be remembered that the statement now issued is in no sense a profit and loss account.

**Chelmsford Corporation and the Gas-Works.**—At the monthly meeting of the Chelmsford Town Council last Wednesday, the Parliamentary Committee appointed at the recent special meeting of the Council [see *ante*, p. 240] reported that they had elected the Mayor as their Chairman; and they recommended that Messrs. Hargreaves and Crowther be appointed Parliamentary Agents to the Council in respect of the Bill agreed to be promoted for the acquisition of the undertaking of the Chelmsford Gas Company, and for such other purposes as may hereafter be decided by the Council. It was further recommended that the firm named and the Town Clerk should be authorized to proceed with the preparation of the draft Bill. The recommendations were agreed to.

**Penryn and Falmouth Town Councils and the Water-Works.**—At a recent meeting of the Penryn Town Council, the General Purposes Committee reported that, as the result of a communication from the Falmouth Town Council, the Mayor (Alderman G. Read) and certain aldermen and councillors were elected to confer with a Committee of the Falmouth Corporation respecting the desirability of purchasing the Falmouth Water Company's works. The Council adopted the Special Committee's report of the meeting arranged, which set forth that the Joint Committee recommended that the Town Clerk of Falmouth should write to the Secretary of the Company asking if they were prepared to dispose of their undertaking, and on what terms. Also that the President of the Institution of Civil Engineers should be asked to name three civil engineers experienced in water-works undertakings, so that their terms might be obtained for advising as to applications by the Company under the terms of their Acts and the consequent value of their undertakings, and as to the possibility of an application for the purchase being successful.

# MISCELLANEOUS NEWS.

## COAL SMOKE ABATEMENT COMMITTEE.

### Further Evidence on Behalf of the Gas Industry.

The Departmental Committee appointed by the Local Government Board to consider the question of smoke abatement* held further sittings on Wednesday and Thursday last week. The most important witness during the two days was Professor John W. Cobb, Livesey Professor in the Department of Coal Gas and Fuel Industries in the University of Leeds.

#### EVIDENCE OF PROFESSOR COBB.

Professor COBB said that he had held the position of Livesey Professor for two years. Before that he held, for twenty years, the position of Chief Chemist to the Farnley Iron Company, and Scientific Adviser to Mr. R. Armitage, M.P., the Managing-Director of the Company. The Company owned large works for the production of glazed bricks, sanitary ware, and fire-bricks, as well as fire-clay blocks used in furnaces; while a branch of the works was devoted to the production of the best Yorkshire iron and high-quality wrought iron. Attention was first directed to the manufacture of glazed bricks. In the early days the kilns in use for burning glazed bricks were of the vertical down-draught type, in which raw coal was consumed; there being on an average some 16 grates to a kiln. In these, the fire ascended around the kiln and afterwards descended; and the products of combustion escaped through the floor into a central flue, through which they were carried to the chimney outside. In the first stages of the burning it was necessary to raise the temperature very slowly, in order to prevent loss by the cracking of the materials being dealt with. During the whole of this time the coal-fires were necessarily small, and a great quantity of air had to be passed over them—the object being practically to produce a large amount of hot air to begin with. As the firing progressed the fires were made larger, and consequently became hotter; at the same time, the temperature of the kiln and of the contents rose until it reached a full red or yellow heat. The length of the initial process depended to a large extent on the contents of the kiln; but the average period could be taken at 24 hours, during which time smoke was produced, owing to the coolness of the fire. The smoke, however, was not black, on account of its dilution with the large quantity of air. In the later stages the amount of smoke emitted was smaller; but smoke was always emitted at the time the fires were mended. Some ten years ago, however, the Company erected a Mond gas plant; and after many experiments it was found possible to apply this gas to the burning of glazed bricks. Indeed, the results were more satisfactory from the point of view of the product; while the cost was also lower. Practically the whole output of the works as regards glazed bricks was now produced in furnaces fired with Mond gas.

The CHAIRMAN: You were the pioneers of this as far as your trade was concerned?

*Witness* replied that this was so. The necessary adaptations of the existing furnaces had been made at comparatively small cost; but this had been possible only after a considerable number of experiments.

Then you have eliminated smoke altogether?—From that section of the works.

Do you know whether your example has been largely followed in the trade?—No, I do not think it has.

Speaking with regard to the pottery trade as distinct from the particular work carried out at the Farnley Iron-Works, witness said he could not understand why the application of gas could not be successfully carried out. He had heard that Mr. Twyford, of Hanley, had carried out experiments; but he rather imagined that they had been abandoned too early. The conditions of success were not likely to be obtained in first experiments of this character. These experiments of Mr. Twyford, however, he believed had been made years ago.

Professor COHEN: Do you know of any reason why it has failed in Staffordshire?

*Witness:* I have not heard of anything I should like to repeat.

Speaking in more detail with regard to the application of gas to the initial process of the manufacture of glazed bricks, witness said that when the temperature had to be raised very slowly, as already explained, gas could be more advantageously used because of its greater ease of regulation, while at the same time complete freedom from the emission of smoke was secured on account of the washing to which the gas had been subjected. Furthermore, when coal was used there was always a disfiguring action on some of the bricks, as the ashes and dust fused into them and spoilt them. Coming to the manufacture of fire-bricks, witness recalled that the first important invention towards preventing the emission of smoke was the continuous kiln of the Hoffmann type, in which the coal was fed down in small quantities among the red-hot bricks which were being burned. In this the products of combustion passed necessarily through a considerable quantity of red-hot bricks before coming to the chimney. The process was tolerably successful for the burning of ordinary fire-bricks; but it had the disadvantage that many of the bricks were disfigured by the fusing of the ash in a similar way to that already mentioned in connection with glazed bricks. In this case, however, the effect was more serious, as the ash acted as a flux on the faces of the bricks. Consequently, some continuous kilns had been altered in recent years to burn with gas; and the alteration had been quite satisfactorily carried out. The whole of the fire-bricks manufactured by the Farnley Iron Company were now made by means of gas—of course, without the emission of smoke, and also without the previous waste due to the fusing of the ash on the bricks. Here, again, the ordinary kilns were altered, but the essential structure of the kiln remained undisturbed.

The CHAIRMAN: It was not an expensive reconstruction at all?

*Witness:* No, not at all.

---

* See "JOURNAL," July 14 and 28, pp. 117, 234.

Mr. BREVITT: Is that ordinary gas or Mond gas?

*Witness:* It was Mond gas.

Continuing, witness said that most of the output of glazed bricks, sanitary ware, and fire-bricks of the Farnley Iron Company was not burned by gaseous fuels.

The CHAIRMAN: You say "most." Why not all, if it is so successful?

*Witness* explained that part of the output of the Company was known as salt glazed ware, and for this purpose the use of gaseous fuel was considerably more difficult—he would not say impossible, because he did not think it was actually impossible. In order to make salt glazed ware the salt had to be mixed in certain proportions, and the volatilization of the salt was carried out by actually putting it on the fires. A considerable local store of heat was required in order to volatilize the salt satisfactorily; and for this reason the application of a gas-fire was not a simple process.

The CHAIRMAN: If you were to introduce salt into a kiln burning gas, you would probably have to introduce it in a state of vapour?

*Witness* said he believed this was the best way of doing it, and he had experimented extensively on these lines. It was a possible thing to do, but inconvenient. It was so far inconvenient that, while the firm were generally alive to the advantages of gas firing they were still using coal firing for this particular purpose. In the experiments he had carried out he had introduced salt vapour by a blast after it had been vaporized in a separate coke-fire outside. Nevertheless, he did not think it was impossible to deal with the matter in this way. The point was the necessity for having a large supply of energy localized, which could not be obtained with gas as with a coal-fire. The localized energy in the case of producer gas was at the producer plant, which might be a quarter of a mile away.

The CHAIRMAN: On the whole, the conversion of the kilns to gas firing has been commercially advantageous?

*Witness:* Quite. Both technically and commercially it has been a success. It ought, however, to be borne in mind that such a washed gas as Mond gas can only be used with maximum economy when the nitrogen in the coal is recovered as ammonium sulphate; and this is not possible unless the furnace gasifies an amount of coal per day which I should place tentatively, and with hesitation, at 40 tons.

The nitrogen in the coal is a small proportion of that in the air?—Yes; but the ammonium sulphate is only made from the nitrogen in the coal—it is not atmospheric nitrogen at all.

Continuing, witness said that from 80 to 100 lbs. of ammonium sulphate per ton of coal could be derived with the Mond process; but it could not be done when working on a very small scale.

Professor COHEN: The price of coal would be a factor?

*Witness* agreed that with the price of coal in London there would not be the same profit as in Yorkshire. Small works might get over the difficulty by combining to take gas from one large station.

In concluding his remarks upon the use of gas in the manufacture of glazed bricks, sanitary ware, and similar products, witness said that the employment of gas in these connections had been proved beyond demonstration, and it was extremely probable that it would be successful in other classes of ware, such as pottery, although these had not come directly under his notice.

Coming to the question of the reheating of iron and steel for welding, hammering, or annealing, witness said that both coal firing and gaseous fuel could be equally well used. While this particular aspect of the use of gas had not come under his direct attention, nevertheless the control of the combustion with coal firing was very inferior compared with the use of gas, since the presence of the free oxygen with coal firing induced a large wastage of iron, and often resulted in the complete spoiling of the material being heated. Further, it was practically impossible to heat these materials by means of coal without the emission of large quantities of smoke. Practically the whole of the output of the Farnley Iron Company with regard to metal was now heated by gas. In fact, there was only one furnace using coal, which could be converted at any moment. It was not retained as a coal-fire because there was any difficulty, either technical or commercial. The application of the principle of regeneration had been an important factor in the use of gas for these purposes. The accurate control of the atmosphere and the temperature enabled the best results to be obtained, both as regards fuel consumption and quality of material. He had had no experience, however, of treating special grades of steel by gas. Reference was next made to puddling, with which the application of gas was difficult, owing to the necessity for the maintenance of a definitely reducing atmosphere for considerable periods of time unless excessive waste was to ensue. This was always accompanied by large quantities of smoke, and no great measure of success had so far been attained in the experiments that had been made in the application of gas for the purpose. Puddling, however, was now a comparatively small matter in the iron and steel industries compared with some years ago—*i.e.*, the quantity of wrought iron bears only a small proportion to the total output of wrought iron and steel produced. Further, if a smokeless puddling furnace could be invented, the conditions would be very much worse for the puddler than they were at present; and he was not at all sure it would be fair to introduce it. Even a gas-fired puddling furnace might make smoke.

Witness was then invited to express his opinion as a scientific man upon the fuel question generally. He said he could not do this better than by quoting from a speech which he made at a recent meeting of the Society of Chemical Industry. [This speech was given practically in full in the "JOURNAL" for July 21 last, p. 171].

This completed Professor Cobb's evidence in chief.

In answer to Professor COHEN, witness stated that he did not see any immediate possibility of the adaptation of gas to the puddling furnace.

Replying to further questions with regard to the evidence as to the pottery-trade [*ante*, p. 234], witness said he could not account for any failure, and did not know of any reason for it in the pottery trade.

Discussing Lord Newton's Smoke Abatement Bill, witness said he did not claim to have examined this from the point of view of a lawyer; but there were several matters in it which needed making more clear. For instance, with regard to exemptions, was it intended that a special exemption would have to be obtained for every furnace in a particular factory, or would a particular trade have to claim exemption on account of its special processes? Again, what was the meaning of the phrase "smoke of any other colour" in addition to black smoke. It was very difficult to always prevent the emission of smoke of some colour, especially during the period while the dampers were being adjusted in order to work under the best conditions for combustion. During this short period there must be a certain amount of smoke; but when they settled down to normal conditions, in first-class boiler practice there should be no smoke. Perhaps, however, this condition would be met by the provision in Lord Newton's Bill relating to the accidental emission of smoke.

In answer to further questions, witness said the Farnley Iron Company did not use gas for boiler purposes. The coal-fired boiler was a highly-efficient apparatus. There was not the same possibility of improvement here by the application of gas as there was in the other directions to which he had referred. Furthermore, a properly-fired coal-boiler could be worked without making smoke.

Replying to Mr. R. DUNCOMB SELLS (a member of the Committee and General Manager of the Machinery Users' Association), witness said that in the case put to him of a colliery using processes in which the emission of smoke might be more or less inevitable, and also at the same time using coal for boiler firing, he would not be in favour of exempting the whole of the colliery from the provisions of any new legislation, but only the particular processes in which it was difficult to avoid making smoke. He expressed the opinion that further legislation was desirable in order to lessen the emission of smoke in industrial processes; but he regarded the words "or smoke of any other colour" in Lord Newton's Bill as being too drastic.

Bailie SMITH suggested that, in the case of salt glazing, the desired effect could be obtained by throwing the salt on to a substance heated by gas.

*Witness* said it was not easy to do this. There were several things he could suggest as being possible, however, in this connection.

In reply to Mr. BREVITT, witness stated that the Mond gas used at the Farnley Iron-Works was made by the Company themselves.

Colonel HUGHES, referring to the suggestion that a certain amount of smoke might be given off from the use of gas, remarked that he supposed it was this smoke which caused the discoloration of decorations where gas was used for lighting.

*Witness* said that this would be slandering gas, because the cause of discoloration on ceilings and decorations was dust in the air which had been charred by the heat.

The CHAIRMAN, referring to the doubts in the mind of witness as to exemptions under Lord Newton's Bill, said that whereas at present there were specific exemptions, under the Bill in question each industry would have to satisfy the Local Government Board that it should be specially exempted.

### MODERN BOILER FIRING AND SMOKE EMISSION.

The other evidence given before the Committee on Wednesday and Thursday last week was not of special interest to the gas industry. It was given by users of large quantities of steam for such purposes as sugar boiling, and also in the cotton industry; but there was some conflict of opinion as to the possibility or otherwise of making smoke under modern conditions of boiler firing.

Mr. *J. Clark*, an engineer in the employ of Messrs. H. Tate and Sons, sugar refiners, expressed the opinion that there was no economy—or at any rate, very little—in the avoidance of smoke from boilers, and that none of the chain grate stokers on the market, especially under conditions of heavy load, really brought about smokeless conditions.

On the other hand, witnesses from the cotton trade held a directly opposite opinion, and brought evidence to prove that, in their case, considerable financial economy had been effected by the adoption of more up-to-date methods of firing.

### TRAINED SMOKE INSPECTORS.

A point upon which all the other witnesses were in agreement, however, was that smoke inspectors should be technical men who could go considerably further than merely watching for the emission of smoke and then issuing summonses. It was suggested that they should be men trained in such a way that they could make suggestions to manufacturers as to improvements in the equipment which would lead to the avoidance of smoke.

The Committee meet again to-morrow (Wednesday).

## BRENTFORD GAS COMPANY.

### Half-Yearly Report and Accounts.

The Directors of the Brentford Gas Company, in their report for the six months ended the 30th of June, which is to be presented at the half-yearly meeting on Friday, state that the accounts show a profit on the revenue account for the half year of £56,111. After providing for fixed charges, there remains the sum of £51,229, which, with the balance brought forward from last account, makes an amount of £123,188 available for dividends. The Directors recommend the declaration of dividends, subject to income-tax, at the rate of 5 per cent. per annum on the preference stock, 14 per cent. per annum on the consolidated stock, and 11 per cent. per annum on the new stock, 1881. The increase in the quantity of gas sold is 7·42 per cent. over the corresponding half year. The total number of consumers is now 108,038, as against 103,600 last June half year—an increase of 4·28 per cent. The Directors report that the Bill promoted in the present session of Parliament for the conversion of the Company's capital and the acquisition of the undertakings of the Staines and Egham District Gas and Coke Company, Limited, and the Sunbury Gas Consumers' Company, Limited, has passed the Committees of both Houses of Parliament, and now awaits the Royal Assent.

The accounts accompanying the report show that the revenue from the sale of gas amounted to £210,210; from the rental of meters, stoves, and fittings, to £33,514; and from the sale of residual products, to £48,396—the total receipts being £292,164, as compared with £289,854 in the first half of 1913. The expenditure on the manufacture of gas was £156,355; on distribution, £46,434; and on management, £9207—the total expenditure being £236,052, as compared

with £225,970 in the six months ended June 30, 1913. The balance carried to the profit and loss account (£56,111) compares with £63,884 last year.

There were 93,036 tons of coal and 1,765,407 gallons of oil used during the half year in the production of 1,902,496,000 cubic feet of gas (including 782,471,000 cubic feet of carburetted water gas), of which 1,793,347,000 cubic feet were sold and 1,823,215,000 cubic feet were accounted for. The estimated production of residuals was: Coke, 58,160 tons; breeze, 8967 tons; tar, 1,210,037 gallons; ammoniacal liquor, 32,080 butts.

## AUTOMATIC LIGHTING AT WEST BROMWICH.

Last Wednesday, at a meeting of the West Bromwich Town Council, the Gas Committee presented a report with regard to street lighting. They stated that they had had under consideration the question of the automatic lighting of the public lamps, and recommended the installation of Horstmann automatic lighting appliances, at a cost of about £1430, which amount would be paid out of revenue.

A discussion arose, and Alderman Blades said he had no doubt this was the proper course to take; but the Council would, he thought, like to know the extent of the saving by this new method of lighting. Mr. Bates asked whether the apparatus they proposed to instal was similar to that which they now had in the Hall End and Old Church district, because he had often seen these lamps alight in broad daylight, and not burning when they should be. Mr. Kenrick inquired if the proposed new appliances would be attached to the whole of the lamps in the borough.

Mr. Brockhouse (the Chairman of the Gas Committee) said it was not the same kind of appliance as had already been in use, and which it was admitted was an entire failure. The question had been thoroughly discussed in Committee, and they were adopting the new system for the good of the undertaking. He asked Alderman Blades to wait a little time for a reply to his question. There would be a considerable saving; but he could not say off-hand what it would be. The apparatus would be applied to the whole of the lamps in the borough.

The recommendation was approved.

## SMETHWICK GAS UNDERTAKING.

### Engineer's Salary Increased.

The Smethwick Town Council on Tuesday night considered a recommendation of the General Purposes Committee that the salary of the Gas Engineer (Mr. Vincent Hughes) be increased, as from July 1, by £50 per annum (from £500 to £550), and afterwards by £25 per annum in each of the two succeeding years, up to £600 per annum.

A remarkable closeness of the voting was due to the fact that it was 7 o'clock before the matter was introduced to the Council, and only about two-thirds of the members were present. Those who were opposed to the increase embraced the opportunity to try to defeat the proposal; and after the Mayor had proposed the adoption of the recommendation, Mr. Morris moved the adjournment of the Council until September. This, however, was lost. Mr. Collins then urged that the recommendation was absolutely irregular and out of order. They had considered the matter in Committee, and the motion to grant the increase was only carried by the casting vote of the Mayor. This was sufficient to prevent them giving their whole-hearted support to the recommendation. The Standing Orders provided that questions of salary should only be brought forward at the February meeting. Mr. Meese said the Gas Committee seemed a little too generous; but he felt something should be done to improve the Gas Engineer's position, as the work had increased, and he was entitled to further remuneration. He moved, as an amendment, that an increment be granted of £25 for the next two years, when the matter would again come up for consideration. There was no seconder to this, and it fell through.

The voting was then taken on the recommendation of the Committee, with the result that it was equal—nine for, and nine against. The Mayor (Mr. T. W. Evans) again gave his casting-vote in favour of the increase, and the recommendation was adopted.

## EARLY DAYS OF GAS LIGHTING IN ROME.

### Clerical Objections to its Introduction.

In the "JOURNAL" for the 30th of June (p. 1061) we gave some particulars in regard to the progress of lighting in Rome during the past fifty years. By way of supplement to them, it may be of interest to reproduce from the "Evening Standard" of last Wednesday the following interesting and rather amusing account, translated from the "Journal des Débats," of the difficulties gas had to face in making the conquest of the Vatican.

In 1844 an English engineer settled at Rome, and was well received by Society. After a time he asked for an audience of the Pope—Gregory XVI.—in order to obtain permission to set up gas-works in the Eternal City. His reception at the Vatican was not flattering to his hopes. "I don't understand," said the Pontiff, "how you can submit to me a proposal so inimical to the interests of the Church." The engineer was taken aback, but replied that he really could not see what bearing gas lighting could have on Catholicism. "It has a very direct bearing," said the Pope. "The Faithful are in the habit of burning wax candles before the image of the Madonna. What do you think would become of this custom when they saw far more brilliant lights in their homes and in the streets?"

So the introduction of gas came to a standstill. But Popes are not immortal, and Gregory XVI. was succeeded by Pius IX., who brought more modern ideas into the Vatican, and the discussion of the gas question would have been forthwith taken up again had not the Revolution given him something far more serious to think about. However, after his return to Rome in 1852, he reopened the question, and two years later gas lighting was inaugurated. Prince Doria Pamphili gave a *soirée* in his palace on the Corso, when his winter garden was turned into a fairyland by lighting 2000 gas-jets.

But another struggle was destined to arise between the Gas Company and the Vatican. This time it was no longer a question of using gas in the Roman churches, but electricity. Several parishes asked to have it, and also some families who had undertaken to keep lamps perpetually burning. The Vicar of Rome, Cardinal Parocchi, proved to be as hostile to progress as Gregory XVI. had been, and the affair hung-fire till his death. The first act of his successor, however, was to remove the embargo, and along with it the others under which the older system of gas lighting had always laboured.

## A HISTORICAL NOTEBOOK.

A very interesting souvenir has been forwarded by Mr. Austen Chamberlain to Sir Hallewell Rogers, as Chairman of the Birmingham Corporation Gas Committee, in the shape of a pocket-book found among the late Mr. Joseph Chamberlain's papers. It contains a small notebook full of memoranda and statistics relating to the purchase and working of the gas undertaking; practically every word and figure being in Mr. Joseph Chamberlain's handwriting. It will be greatly valued, as showing the close personal care which Mr. Chamberlain had for every detail connected with the matter.

Sir Hallewell Rogers informed the members of the Gas Committee of the receipt of the gift; and it was unanimously resolved—"That the best thanks of the Gas Committee be conveyed to the Right Hon. J. Austen Chamberlain, M.P., for the gift of the notebook belonging to his father, containing much interesting information relating to the early work of the Gas Committee, which shows the minute care he bestowed upon the undertaking."

The notebook, it is said, was known as "Mr. Chamberlain's Pistol" when the deceased gentleman personally conducted the Corporation case in both Houses of Parliament, on account of the facility with which he fired-off statistics and figures at his interrogators.

## LIGHTING THAMES BRIDGES AND EMBANKMENTS.

### Suggested Improvements.

The following comments on the Lighting of Thames Bridges and Embankments appeared in the "Sanitary Record and Municipal Engineering" last Friday.

It is high time that some improvement was made in the lighting of London's bridges and riverside embankments; for no other public lighting is quite so conspicuous, and, as at present arranged, no other lighting quite so crude. Yet probably in no other place could good lighting be seen to such advantage. Practically the whole of the bridge lamps are of the most commonplace type—details not at all in keeping with the bridges. We are strongly of opinion that the lamps and their columns should be designed as part of the bridge, and not, as appears to be the case, merely tacked on as an afterthought. An attempt has recently been made to liven-up the Tower Bridge by installing high-pressure gas-lamps; but while, owing to the peculiar conditions, this is quite satisfactory in this particular case, we do not think it would be the most effective arrangement on the up-river bridges. We should much prefer to see white glass spheres used, fitted with either gas or electric lamps, and arranged either singly or in groups on artistic columns. This is a system much used in America, where it is known as the "White Way" system; and the effect is particularly pleasing, while the illumination is good. The same system would be specially well suited for the lighting of the embankments. At present the lighting of these is a disgrace to London. The Albert Embankment is miserably lighted by means of upright incandescent gas-burners of about 30-candle power in globe lamps of quite passable design; while the fine Victoria Embankment has some really good lamps along the wall, quite spoiled by the makeshift manner in which the electric glow lamps are fixed and the dismal light they give. The glassware, too, seems to be in perpetual need of cleaning. On the roadway, electric arc lamps have been carefully hidden in the tree tops in a most absurd manner, so that the bulk of the light is lost in the trees and does not reach the road. We cannot imagine a finer opportunity for a really good display; but it seems too much to hope that the authorities responsible are in touch with the present-day possibilities of lighting. When, however, they are convinced that the existing lighting is capable of considerable improvement, we hope that the "White Way" system will receive due consideration, as we are convinced that it would be most satisfactory.

## LIVERPOOL CORPORATION WATER SUPPLY.

### Annual Report of the Engineer.

The report of Mr. Joseph Parry, M.Inst.C.E., formerly Engineer-in-Chief, and now Consulting Engineer, to the Liverpool Corporation, on the water undertaking for the year 1913, has been issued. It shows that the average quantity of water supplied per day was 37,163,000 gallons, and the estimated population served was 1,174,555. The corresponding quantities for 1912 were: Average per day, 36,736,000 gallons; population, 1,165,623. The increase in consumption for the year, therefore, was 427,000 gallons per day. The quantity of water supplied in the compulsory area was 11,769,221,000 gallons, or at the average rate of 35·09 gallons per head per day; outside the area, 1,758,400,000 gallons—making a total of 13,527,621,000 gallons. The sources of water were: Vyrnwy, 7,916,024,000 gallons; Rivington, 4,679,296,000 gallons; and wells, 932,301,000 gallons. The number of new water tenants added during the year within the compulsory

limits of supply was 1359; and the length of new mains laid was 8 miles 435 yards. This brought up the total length to 912 miles 1235 yards. There were 138,692 inspections made for the deduction of waste, and 31,584 defects discovered. Of these, 14,120 were repaired at the time of inspection.

With regard to new works, the construction of the Malpas reservoir was completed early in October, when it was tested for leakage and found to be absolutely water-tight. It is circular in form, with an internal diameter of 240 feet; and when full it contains 4,436,100 gallons. The wall is 256 yards in length, and is composed of concrete faced with blue bricks. It was built in the summer of 1912 in six sections; the intervening spaces being afterwards filled in slowly. The floor is of concrete, 9 to 10 inches thick, with 1 inch of quartz rendering on the top. It was laid in 528 separate sections, each being surrounded by an asphalt joint ¾ inch wide. The reservoir was opened on the 6th of December by the Lord Mayor of Liverpool, accompanied by members of the Water Committee.

The capital expenditure on the water-works up to Dec. 31 last has been £6,527,897, apportioned as follows: Harrington and Bootle Companies' works, £578,684; Green Lane works, £71,056; extensions of home works (wells, service reservoirs, and mains), £1,168,117; Rivington works, £1,718,223; Chorley works, £32,624; and Vyrnwy works, £2,959,193. The revenue last year was £385,762; and the expenditure £381,108—a difference of £4654.

## NOTES FROM SCOTLAND.

### From Our Own Correspondents.

*Saturday.*

The accounts of the Edinburgh and Leith Gas Commissioners have now been duly audited, and the Convener of the Finance Committee, Mr. M'Michael, moved their adoption. In doing so, he said that, since the last meeting, they had had ample testimony that their deficiency on the year's working was no exception to the experience of most other large concerns in England and Scotland. In nearly all cases the balance-sheets told the same tale—a steady increase in consumption, especially for such domestic purposes as cooking and heating; but higher wages and higher prices for coal all increasing the cost of production. In another point other concerns showed a like experience—viz., a marked shrinkage in the amount received for residuals. The prices for coal, with the present unrest in the industrial world, might continue to fluctuate. He therefore suggested accumulating substantial balances, so as to ensure uniform instead of fluctuating prices in the commodity they manufactured. Their own reserve fund had been depleted, but he thought they might look forward to a favourable report next year. The accounts were then adopted. For the Works Committee, Judge Lindsay reported on the differences that had arisen between the Gas Commissioners and the Amalgamated Society of Engineers; the latter complaining that the Commissioners were getting tradesmen's work done by handy men. Their Committee were, however, satisfied with the reply Mr. Masterton had given, that so far as possible the principle was being applied of full tradesmen doing tradesmen's work. The rate for stair gas lighting in Leith has now been fixed at the Edinburgh rate. Leith, however, is using flat-flame burners, while incandescent burners are used in Edinburgh.

A report which has been supplied by Mr. Herring and Mr. Masterton on the question of buying 150 waggons shows that their cost for repairs and maintenance is at the rate of 2 per cent. per annum. Their life may be put at 30 years, and the purchase price at £73 15s. each, as against hiring at £9 15s. per annum. If the money is borrowed at 3½ per cent., *plus* 1 per cent. for sinking fund, this absorbs £3 6s., leaving 9 per cent. for maintenance, &c. They sum up the figures by saying that the purchase of 150 waggons will save £577 over the hiring of them.

Another report by Mr. Masterton deals with the question of high-pressure lighting. The Leith Corporation asked for a quotation for sunset-to-sunrise lamps in the main street to Leith, twelve in all. A charge of £10 10s. was asked. It was also hoped that, by a canvass of the shopkeepers on that route, which would include the goods stations of the North British and Caledonian Railway Companies, a large increase in the use of high-pressure gas might be obtained, and enable the utilization of some of the surplus power available.

The new Prestonpans Gas Company, which was recently formed to take over that undertaking, has now completed a new gasholder of 38,000 cubic feet capacity, which should enable the supply to be kept more uniform, and cheapen the cost of production.

The Glasgow Corporation decided to keep the prices of gas to ordinary consumers as last year—namely, from 1s. 11d. for small quantities to 1s. 8d. for large consumers. The price for prepayment meter supplies has been reduced by 1d. per 1000 cubic feet, to 2s. 4d.

## CURRENT SALES OF GAS PRODUCTS.

### The London Market for Tar, Tar Products, and Sulphate.

LONDON, *July* 31.

There is no change to report in the position of pitch, and makers still quote 36s. 6d. to 37s. per ton net and naked, at makers' works. Pyridine is firm at 8s. 7½d. per gallon net into buyers' packages, and creosote is 4d. per gallon, net and naked. Benzol is 1s. 2d., solvent, 90-160, 10¾d.; and 90 per cent. toluol 11d. per gallon, all net and naked. Anthracene, 40-45 per cent., is 2d. per unit, packages free. Crude carbolic acid 60's is nominal at 1s. 2d. per gallon net, casks free. If

KEEP TO THE MAIN.

GAS is on trial every time a Cooker is fixed. There need be no fear of the verdict if it is a Main. The Main Cooker gives the least amount of trouble to maintain at a satisfactory efficiency and will prove the superiority of gas over any other fuel. Keep to the Main.

R. & A. MAIN, LIMITED.

WORKS: Gothic Works, EDMONTON, N.; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.

SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.; 136, Renfield Street, GLASGOW; 56, Broad Street, BIRMINGHAM; 83, Old Market Street, BRISTOL; 13, Whitworth Street West, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

the present European situation develops, it is expected that all carbolics will be dearer.

Sulphate of ammonia, 25 per cent., remains steady at £10 15s. per ton net into buyers' bags, for delivery down to September.

### Tar and Tar Products in the Provinces.

*July* 31.

The average values during the week were: Tar, 25s. to 29s. Pitch, east coast, 33s. 6d. to 34s.; west coast, Manchester, 32s. to 33s.; Liverpool, 33s. to 34s.; Clyde, 33s. to 34s. Benzol, 90 per cent., naked, North, 8½d. to 9d.; 50-90 per cent., naked, North, 10d. Toluol, naked, North, 10d. to 10½d. Crude naphtha, in bulk, North, 4¼d. to 4½d. Solvent naphtha, naked, North. 8½d. to 8¾d. f.o.b. Heavy naphtha, naked, North, 9d. to 9½d. f.o.b. Creosote, in bulk, North, 3¼d. to 3⅜d. Heavy oils, in bulk, 3⅝d. to 4¼d. Carbolic acid, casks included, 60 per cent., prompt, east and west coasts, 1s. 1d. to 1s. 1½d. Naphthalene, £4 10s. to £10; salts, 55s. to 60s., bags included. Anthracene, "A" quality, 1½d. to 1⅝d.; "B" quality, nominally ¾d. per unit, packages included and delivered.

### Sulphate of Ammonia Prices in the Provinces.

LIVERPOOL, *July* 31.

In the early part of the week the tone remained very firm, and full prices were paid for all parcels in the market; but towards the close there was less demand, owing to the uncertainty in the political outlook, and a slight reduction in values took place. The quotations are now £11 per ton f.o.b. Hull, £11 1s. 3d. f.o.b. Liverpool, and £11 2s. 6d. f.o.b. Leith. In the forward position, few first-hand transactions have been reported; but it has transpired that £11 7s. 6d. per ton f.o.b. Liverpool was paid a few days ago to manufacturers, for October-December delivery.

### Nitrate of Soda.

This article is still unchanged at 9s. 10½d. per cwt. for ordinary and 10s. 1½d. for refined quality, on spot.

From another source we learn that there is nothing fresh to report concerning sulphate of ammonia. Little or no business has been done during the past week, and prices are written about the same. Outside London, makes are quoted £10 7s. 6d.; Hull, £10 17s. 6d.; Liverpool, £11; Leith, £11 2s. 6d.; Middlesbrough, £11.

**Gas as an Aid to Suicide.**—A woman was discovered dead in bed at Leigh-on-Sea last Sunday week, with a sheet over her head and the end of an open gas-pipe in her mouth. She left a letter which indicated that she had suffered from illusions. At Sheffield, last Tuesday, a plumber was also found dead near a pipe in which a cut had been made, and from which gas was escaping.

## COAL TRADE REPORT.

### Northern Coal Trade.

The coal trade has been further disturbed by the declaration of war; and while there is a fair export of coal being effected, there are few forward sales at present. In the steam coal trade, best Northumbrians are nominally about 15s. per ton f.o.b., second-class steams 12s., and steam smalls from 8s. to 9s. 3d. The political outlook has, however, so disorganized the trade, and rendered sales provisional, that little business is being done for delivery into the danger zone. In the gas coal trade, there are steady shipments to home ports, and these should grow now; but foreign shipments are interfered with much as in steam coals. Best Durham gas coals are 13s. to 13s. 3d. per ton f.o.b., second-class steams 11s. 9d. to 12s., and "Wear specials" 13s. 6d. to 13s. 9d. There are still some small contracts in the market; but there is little disposition to enter into large commitments at present, as there is not only the possibility of exports being interfered with, either in delivery or for payment, but there is the certainty of higher freights when the voyage is in certain directions. It will be some little time before the market settles down under the new conditions. Coke is not much altered. Gas coke is in fair inquiry; but the production is slowly increasing. Good gas coke is from 12s. to 13s., according to the quality and the period and locality of the sale.

## Leatherhead Gas and Lighting Company.

The report of the Directors for the year ended June 30 (which is to be presented at the meeting to-day) states that the receipts amounted to £16,632, and the working expenses to £14,406, leaving a profit of £2226, to which must be added £3146 brought from the previous year, making a total of £5372. Deducting interest on loans and debenture stock, and the interim dividend of 2½ per cent. paid in February, there is a balance of £3199 available for division among the shareholders. The Directors recommend the payment of a further dividend of 2½ per cent. (making 5 per cent. for the year). This will absorb £1441, and leave £1758 to be carried forward. The sale of gas has advanced from 56½ to 64 million cubic feet, an increase at the rate of about 14 per cent. The profits arising from this substantial increase in business have unfortunately being seriously affected by the very high price of coal, coupled with a drop in the value of coke and sulphate; but the Directors state that a much more favourable coal contract has been arranged for the coming year. All gas is now being made at Leatherhead; but considerable inconvenience and expense were caused owing to the contract for the compressors not being completed to time. The Consulting Engineer (Mr. F. S. Cripps), in his separate report, points out that the high-pressure main has been laid from Leatherhead to Cobham; and various necessary additions to the works have been made.


PREPAYMENT METERS

WET AND DRY

Telephone Nos.:
3289 (City) MANCHESTER.
2025 (Central) NOTTINGHAM.

Wires:
"SAWER MANCHESTER."
"SAWER NOTTINGHAM."

SAWER & PURVES
(BRANCH OF METERS LTD.)

MILES PLATTING
MANCHESTER

Scotch Agent: J. D. GIBSON
2, CAUSEYSIDE STREET
PAISLEY

RADFORD ROAD
NOTTINGHAM

## Portsea Island Gas Light Company.

In their report for the half year ended June 30, which will be submitted at the meeting on Thursday, the Directors of the Company state that the profit and loss account shows an available balance of £41,826, which enables them to recommend the declaration of a dividend for the six months at the rates per annum of £13 per cent. on the "A" and "B" shares, £12 per cent. on the "C" shares, £10 per cent. on the "D" and "E" shares, and £5 per cent. on the Company's stock, less income-tax—leaving a balance of £23,644 to be carried forward. All through the Company's district of supply the demand for gas continues to be most satisfactory; the quantity sold for the half year being largely in excess of any previous corresponding period. The revenue, however, was adversely affected by the prices of residuals, the market for which, with the exception of tar, is still depressed. Satisfactory prices were obtained for the 300 new "E" series shares issued in March last. Good progress has been made in the erection of the new chief offices and show-rooms, and also in the re-modelling of No. 1 retort-house at Flathouses; and a sum of £4700 has been transferred to the extraordinary renewals account towards the revenue expenditure in respect of these. The Directors recommend the usual donations of £50 and £5 5s. to the Portsmouth, Portsea, and Gosport Hospital, and the Portsmouth Eye and Ear Infirmary respectively; also the distribution of coke to the value of £100 among the poor resident within the limits of the Company's supply, during the ensuing winter.

The Midleton (co. Cork) Gas Company, at their annual meeting, declared a dividend of 7½ per cent., as against 6 per cent. in the previous year. Mr. P. M'Evoy was commended for his enterprising management of the undertaking.

## Further Electrical Fatalities.

In last week's issue, mention was made of a fatality in connection with the Cardiff Corporation Electricity Department. The man killed was coupling-up low-pressure leads to a transformer in a pit, and in endeavouring to make a sharp bend in the dead cable, he forced it against a temporary high-pressure cable, doing mechanical damage to the latter, and so receiving the full 2500 volts. The effect was made all the worse by the fact that he was leaning against the earthed transformer tank. Unfortunately, he had his thumb on the brass thimble at the end of the low-tension cable. Rubber gloves were provided for him; but as he was not at the time working on a live cable, he did not consider it necessary to use them. It is stated that this was the first fatal accident since the inception of the undertaking; but it has since been followed by another almost exactly similar fatality, in which an electrician named George Rich lost his life. Other fatalities have occurred at Birmingham and Sunderland. In the former case, a man who was working on a 5000-volt switch panel making alterations, without having had the panel made dead, touched a live part; and, in the latter, an employee was starting an electric hammer, when he accidentally touched some 240-volt terminals which were not properly protected.

Messrs. Fletcher, Russell, and Co., Limited, of Warrington, have prepared a neat little folder, suitable for enclosing with correspondence or for general distribution among consumers, drawing attention to the "Fletcher" patent smoothing irons and heaters. The leaflet is headed "The Terrors of Ironing Day;" and, as the firm remark, it will serve to point out to consumers "another of the means by which the use of gas can make life more tolerable during the hot weather."

# GAS COMPANIES IN THE STOCK EXCHANGE.

It would not be an easy task to condense into a few coherent words within the limits of the space at our disposal an effective *résumé* of the scenes and events on the Stock Exchange during the brief span of last week. Superlatives writ large would scarce suffice, as each day came and went more "unprecedented" and more "staggering" than its predecessor. The crisis was reached on Friday, in the early hours of which day the Committee met, and, after anxious consideration, resolved to close the Exchange until some future day, to be fixed later on. This drastic step had become necessary for the protection of all concerned, having regard to the closure of Continental Bourses, the pressure of the mass of securities shot on to our market, and the danger of getting no remittances from abroad. The Manchester, Liverpool, Edinburgh, and Glasgow Exchanges likewise closed. For further protection, the next settlement is postponed until Aug. 27. Later in the day the Bank of England Directors met and advanced the rate of discount from 4 per cent. (fixed the day before) to 8 per cent. Such a week as this has probably never occurred within living memory, and even now we are not "at war." Briefly to review the four working days: Monday opened in deep gloom, and prices were marked down wholesale in expectation. Consols swayed violently, sometimes rising or falling a whole point at a time, and eventually losing 1¼ after some recovery in the afternoon. Tuesday was depressed under the pessimistic influence of Continental centres, which were selling heavily. Consols lost ¾; but the declaration of war was not known before the close. Wednesday opened appalled by this declaration, and for a while business was quite suspended. Seven failures were announced. The afternoon became calmer, and a little investment buying was in evidence. Consols fell ⅜. On Thursday similar conditions prevailed. Markets were quite demoralized, quotations were suspended, and dealings were a matter of negotiation. Consols touched 69¼, and closed at a further fall of 1—a fall of 3¾ in the week. In the Gas Market a very moderate amount of business was done, and prices, as a rule, were not much affected. In Gas Light and Coke issues, the ordinary remained very steady at 102½ to 103¾ until Wednesday, on which day and on Thursday there appeared to be some forced realization, which figured at 100 and 98. In the secured issues, the maximum marked 77 and 79, and the preference 97. South Metropolitan changed hands at 110 to 113. Among the Suburban and Provincial group, Bournemouth "B" made 15⅛ and 15¼, Brentford new 207, Brighton 212, British 44¾, and South Suburban 115½ and 116. In the Continental companies, Imperial suffered from its proximity to war centres, and was put down 10⅜ without business done. Among the undertakings of the remoter world, Primitiva realized 5½ to 5⅝, ditto preference 4¾, and San Paulo 10⅜.

## OFFICIAL QUOTATIONS AT THE CLOSE OF THE WEEK.

Bank Rate (fixed Aug. 1), 10 per cent. Last year, 4½ per cent. Consols, 69½—70½. Previous week, 73½—74.

| Issue. | Share. | When ex-Dividend. | Dividend or Dividend & Bonus. | NAME. | Closing Prices. | Rise or Fall in Wk. | Yield upon Investment. |
|---|---|---|---|---|---|---|---|
| £ | | | p.c. | | | | £ s. d. |
| 1,551,868 | Stk. | April 8 | 2½ | Alliance & Dublin Ord. | 59—64 | .. | 3 18 2 |
| 374,000 | ,, | July 10 | 4 | Do. 4 p.c. Deb. | 76—79 | .. | 5 1 3 |
| 280,000 | 5 | April 29 | 7½ | Bombay, Ltd. | 5⅞—6⅜ | .. | 5 17 8 |
| 50,000 | 10 | Feb. 26 | 16 | Bourne- 10 p.c. | 29—30 | .. | 5 6 8 |
| 352,500 | 10 | ,, | 7 | mouth Gas B 7 p.c. | 15—15½ | .. | 4 10 4 |
| 75,000 | 10 | ,, | 6 | and Water Pref. 6 p.c. | 13½—14 | .. | 4 5 9 |
| 380,000 | Stk. | Feb. 26 | 14 | Brentford Consolidated | 261—268 | .. | 5 5 3 |
| 330,000 | ,, | ,, | 11 | Do. New | 204—209 | .. | 5 5 3 |
| 50,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. | 109—111 | .. | 4 10 1 |
| 206,250 | ,, | June 11 | 4 | Do. 4 p.c. Deb. | 91—93 | .. | 4 6 0 |
| 217,380 | Stk. | Feb. 26 | 11 | Brighton & Hove Orig. | 208—213 | .. | 5 3 4 |
| 244,200 | ,, | ,, | 8 | Do. A Ord. Stk. | 154—159 | .. | 5 0 8 |
| 580,000 | 20 | Mar. 26 | 12½ | British | 44—45 | .. | 5 11 1 |
| 120,000 | Stk. | June 26 | 4 | Do. 4 p.c. Deb. Stk. | 88—93 | .. | 4 8 11 |
| 245,771 | Stk. | June 26 | 4 | Buenos Ayres 4 p.c. Deb. | 85—87 | .. | 4 12 0 |
| 100,000 | 10 | — | — | Cape Town & Dis., Ltd. | 1½—2½ | .. | — |
| 100,000 | 10 | — | — | Do. 4½ p.c. Pref. | 4—6 | .. | — |
| 100,000 | Stk. | June 26 | 4½ | Do. 4½ p.c. Deb. Stk. | 70—75 | .. | 6 0 0 |
| 157,150 | Stk. | Feb. 26 | 5 | Chester 5 p.c. Ord. | 103—110 | .. | 4 10 11 |
| 1,513,280 | Stk. | Feb. 12 | 5/9/4 | Commercial 4 p.c. Stk. | 106—108 | .. | 5 1 2 |
| 560,000 | ,, | ,, | 5½ | Do. 3½ p.c. do. | 103—105 | .. | 5 1 6 |
| 475,000 | ,, | June 11 | 3 | Do. 3 p.c. Deb. Stk. | 69½—71½ | .. | 4 3 11 |
| 800,000 | Stk. | ,, | 4 | Continental Union, Ltd. | 76—79 | .. | 5 1 3 |
| 200,000 | ,, | ,, | 7 | Do. 7 p.c. Pref. | 115—118 | .. | 5 18 8 |
| 492,270 | Stk. | ,, | 6 | Derby Con. Stk. | 123—125 | .. | 4 16 0 |
| 55,000 | ,, | — | 4 | Do. Deb. Stk. | 102—104 | .. | 3 16 11 |
| 1,002,180 | 10 | July 29 | 10 | European, Ltd. | 17½—18* | .. | 5 11 1 |
| 16,362,910 | Stk. | Feb. 12 | 4/17/4 | Gas 4 p.c. Ord. | 98—102 | −3½ | 4 15 6 |
| 2,600,000 | ,, | ,, | 3½ | Light 3½ p.c. max. | 76—79 | .. | 4 8 7 |
| 4,062,235 | ,, | ,, | 4 | and 4 p.c. Con. Pref. | 96—99 | .. | 4 0 10 |
| 4,674,850 | ,, | June 11 | 3 | Coke 3 p.c. Con. Deb. | 73½—74½ | .. | 4 0 6 |
| 258,740 | Stk. | Mar. 12 | 5 | Hastings & St. L. 3½ p.c. | 87—89 | .. | 5 12 4 |
| 70,000 | 10 | April 29 | 11 | Hongkong & China, Ltd. | 16½—16⅝ | .. | 6 11 4 |
| 131,000 | Stk. | Mar. 12 | 7⅝ | Ilford A and C | 151—154 | .. | 4 19 0 |
| 65,780 | ,, | ,, | 6½ | Do. B | 115—118 | .. | 5 3 10 |
| 65,500 | ,, | June 26 | 4 | Do. 4 p.c. Deb. | 92—94 | .. | 4 5 1 |
| 4,940,000 | Stk. | May 14 | 9 | Imperial Continental | 150—160 | −10½ | 5 12 6 |
| 1,235,000 | Stk. | Feb. 12 | 3½ | Do. 3½ p.c. Deb. Red. | 84—86 | .. | 4 1 5 |
| 200,242 | Stk. | Mar. 12 | 6½ | Lea Bridge Ord. 5 p.c. | 119—121 | .. | 5 7 5 |
| 561,000 | Stk. | Feb. 26 | 10 | Liverpool United A | 211—213 | .. | 4 13 11 |
| 718,100 | ,, | ,, | 7 | Do. B | 146—148 | .. | 4 14 7 |
| 806,033 | ,, | June 26 | 4 | Do. Deb. Stk. | 97—99 | .. | 4 0 10 |

| Issue. | Share. | When ex-Dividend. | Dividend or Dividend & Bonus. | NAME. | Closing Prices. | Rise or Fall in Wk. | Yield upon Investment. |
|---|---|---|---|---|---|---|---|
| £ | | | p.c. | | | | £ s. d. |
| 75,000 | 5 | June 11 | 6 | Malta & Mediterranean | 4⅛—4⅜ | .. | 6 9 9 |
| 250,000 | 100 | April 1 | 4½ | Met. of Melbourne 4½ p.c. Deb. | 99—101 | .. | 4 9 1 |
| 541,920 | 20 | May 28 | 4 | Monte Video, Ltd. | 11½—12 | −⅛ | 6 13 4 |
| 1,775,892 | Stk. | Feb. 26 | 4½ | Newc'tle&G'tesh'd Con. | 100½—101½ | .. | 4 9 1 |
| 529,705 | Stk. | June 26 | 3½ | Do. 3½ p.c. Deb. | 82—83 | .. | 4 4 10 |
| 55,940 | 10 | Feb. 26 | 7/14/0 | North Middlesex 7 p.c. | 14—15 | .. | 5 2 8 |
| 300,000 | Stk. | May 14 | 8 | Oriental, Ltd. | 117—122 | .. | 6 11 2 |
| 60,000 | 5 | Mar. 26 | 10 | Ottoman, Ltd. | 7¼—7⅜ | .. | 6 9 0 |
| 60,000 | 50 | Feb. 26 | 13 | Portsea, Island B | 128—131 | .. | 4 19 3 |
| 100,000 | 50 | ,, | 12 | Do. C | 118—121 | .. | 4 19 2 |
| 249,980 | 5 | April 29 | 8 | Primitiva Ord. | 5⅛—6 | −⅛ | 6 13 4 |
| 499,960 | 5 | June 26 | 5 | ,, 5 p.c. Pref. | 4¾—5 | −⅛ | 5 0 0 |
| 521,600 | 100 | June 2 | 4 | ,, 4 p.c. Deb. | 91—93 | .. | 4 6 0 |
| 346,198 | Stk. | June 26 | 4 | River Plate 4 p.c. Deb. | 85—87 | .. | 4 12 0 |
| 150,000 | 10 | May 14 | 6 | San Paulo 6 p.c. Pref. | 10½—11 | .. | 5 9 1 |
| 125,000 | 50 | July 1 | 5 | 5 p.c. Deb. | 47—49 | .. | 5 2 0 |
| 135,000 | Stk. | Mar. 12 | 10 | Sheffield A | 223—224 | .. | 4 9 3 |
| 209,984 | ,, | ,, | 10 | Do. B | 222—224 | .. | 4 9 8 |
| 523,500 | ,, | ,, | 10 | Do. C | 220—222 | .. | 4 10 1 |
| 90,000 | 10 | May 28 | 9 | South African | 10½—11½ | .. | 7 16 6 |
| 6,429,895 | Stk. | Feb. 12 | 5/9/4 | South Met., 4 p.c. Ord. | 111—113 | .. | 4 16 8 |
| 1,895,445 | ,, | July 10 | 3 | Do. 3 p.c. Deb. | 72½—74½ | .. | 4 0 6 |
| 209,820 | Stk. | Feb. 26 | 8½ | South Shields Con. Stk. | 157—159 | .. | 5 6 11 |
| 952,795 | Stk. | Feb. 26 | 6 | S'th Suburb'n Ord. 5 p.c. | 114—116 | .. | 5 3 5 |
| 60,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. | 110—112 | .. | 4 9 3 |
| 117,058 | ,, | June 26 | 5 | Do. 5 p.c. Deb. Stk. | 116—118 | .. | 4 4 9 |
| 629,740 | Stk. | May 14 | 5 | Southampton Ord. | 99—102 | .. | 4 18 0 |
| 120,000 | Stk. | Feb. 12 | 7½† | Tottenham A 5 p.c. | 135—138 | .. | 5 8 8 |
| 742,275 | ,, | ,, | 6† | District B 3½ p.c. | 115—117 | .. | 5 2 7 |
| 181,255 | ,, | June 26 | 4 | 4 p.c. Deb. | 87—89 | .. | 4 9 11 |
| 182,380 | 10 | Dec. 30 | 5 | Tuscan, Ltd. | 5—6 | .. | 8 6 8 |
| 149,900 | 10 | July 1 | 5 | Do. 5 p.c. Deb. Red. | 93—95 | .. | 5 5 3 |
| 236,476 | Stk. | Mar. 12 | 5 | Tynemouth, 5 p.c. max. | 108½—109½ | .. | 4 11 4 |
| 30,000 | Stk. | Feb. 26 | 8⅜ | Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c. | 151—156 | .. | 5 7 4 |
| 255,636 | ,, | ,, | 6¼ | ,, B 3½ p.c. | 129—134 | .. | 5 2 7 |
| 108,075 | ,, | ,, | 5/17/8 | ,, C 3½ p.c. | 110—115 | .. | 5 2 0 |
| 352,000 | ,, | ,, | 6⅛ | Wimbledon 5 p.c. | 117—122 | .. | 5 0 5 |
| 98,000 | ,, | ,, | 6⅜ | Epsom 5 p.c. | 121—126 | .. | 5 5 2 |
| 88,416 | ,, | June 26 | 3 | 3 p.c. Deb. Stk. | 66—69 | .. | 4 6 11 |

Prices marked * are "Ex Div." † Next Dividend will be at this rate.

**Stafford Vertical Retort Installation.**—The Stafford Town Council have accepted the tender of West's Gas Improvement Company, amounting to £17,473, for an installation of Glover-West continuous vertical retorts, and £1740 for foundations. The acceptance is subject to the Local Government Board sanctioning a loan for £20,000.

**Blackburn Corporation Gas Undertaking.**—The report of Sir Corbet Woodall, D.Sc., concerning the Blackburn Corporation gas undertaking, which was given in the "JOURNAL" a few weeks ago, formed the subject of a long discussion at a meeting of the General Purposes Committee of the Corporation last week. A Special Committee was appointed to deal with the matter.

**Leatherhead Water Company.**—The report submitted at the half-yearly meeting of the Company last Saturday stated that the receipts for the half year ended June 30 amounted to £5273, and the working expenses to £2521, leaving a profit of £2752, to which had to be added £780 brought from the previous half year. Deducting the interest on debenture stock and loans, there remained £3268 available for division; and out of this dividends were recommended at the rate of 10 per cent. per annum on the original shares and 7 per cent. per annum on the remaining shares—leaving £1123 to be carried forward.

**Fusing Electric Wires.**—Damage to the extent of about £5000 was caused last week to a Huddersfield paper factory by a fire arising, it is supposed, from the fusing of an electric wire. Edward Smith, a fireman, came in contact with live electric wires and received a severe shock, necessitating his removal to the infirmary, where he was detained. Two other firemen who went to his assistance also received a shock. Smith touched the wires with his hand, and fell to the floor. India-rubber gloves had to be fetched from the fire station before he could be extricated. He was unconscious, but revived subsequently.

The Power Gas Corporation, Limited, have appointed Mr. J. F. Pasley, from the Stockton office, to be their representative for Lancashire, with headquarters in Manchester; while Mr. F. G. Fogg, lately their North-East Coast representative, will remove to the London address, No. 39, Victoria Street, S.W.

The annual golf competition of the Society of British Gas Industries for the "Yates Cup" was held, on the invitation of Mr. J. W. Broadhead, the Chairman, at the Huddersfield Golf Club Links, Fixby Park, on the 23rd ult., when twenty members competed. Mr. Joseph Clayton proved to be the winner; and the cup was presented after lunch by Mr. Broadhead.

Copies are to hand of two catalogues which have just been issued by the Power Gas Corporation, Limited, of Stockton-on-Tees, describing and illustrating their Mond gas-producer plants with and without ammonia recovery apparatus, and their suction and suction-pressure types of plants for power and heating. The first-named list contains some photographs of Mond gas installations of both types, and there is in both catalogues much useful information for those on the look-out for apparatus of the kind referred to.

Messrs. John Terry and Co., of No. 7, Great Winchester Street, E.C., as Agents for the Metropolitan Gas Company of Melbourne, have received cable advice that the profits of the Company for the half year to June 30 last were £94,800. A dividend of 6s. 6d. per share has been declared for the six months, a sum of £32,000 added to the reserve fund, and a balance of £70,670 carried forward. Drafts are being posted to the absentee shareholders by the first mail after the 30th ult., when it was anticipated the dividends would be payable in Melbourne.

## WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

**Appointments, &c., Vacant.**

ENGINEER AND MANAGER. Tipton Gas Department. Applications by Aug. 24.
ASSISTANT WATER ENGINEER. City of Birmingham. Applications by Aug. 31.
DRAUGHTSMAN. Robert Dempster and Sons, Elland.
WORKING GAS MANAGER. Lymm Urban District Council. Applications by Aug. 15.
SHOW-ROOM ATTENDANT AND CANVASSER. Winchester Water and Gas Company.
CORRESPONDENCE CLERK. No. 5922.
JUNIOR RENTAL CLERK. Winchester Water and Gas Company.
METER REPAIRER. Leeds Gas-Meter Department.
METER REPAIRER. Sheffield Water Department.

**Plant, &c. (Second Hand), For Sale.**

HYDRAULIC MAIN, DIP PIPES, &c. Bideford Gas Company.
EXHAUSTER. Newcastle-on-Tyne Gas Company.

**Gas-Works for Disposal** (Oxfordshire).

C. RYLAND BEEBY AND CO., 63, Basinghall Street, E.C.

**Gas-Works Wanted.**

"D. G.," c/o Scripps's Advertising Offices.

**Meetings.**

IRISH ASSOCIATION OF GAS MANAGERS. City Hall, Dublin. Aug. 11.
BARNET GAS AND WATER COMPANY. Holborn Restaurant. Aug. 26. 12.30 o'clock.
BRIGHTON AND HOVE GAS COMPANY. 5, Great Winchester Street. Aug. 21. 2 o'clock.
NORTH MIDDLESEX GAS COMPANY. 5, Great Winchester Street. Aug. 24. 2.30 o'clock.
RIDDINGS DISTRICT GAS COMPANY. 139, Cannon Street, E.C. Aug. 26. 3.30 o'clock.
SOUTHGATE AND DISTRICT GAS COMPANY, 5, Great Winchester Street, E.C. Aug. 27. 3.45 o'clock.

**TENDERS FOR**

**Coal.**

DEVONPORT GAS DEPARTMENT. Tenders by Aug. 12.
HALIFAX GAS DEPARTMENT. Tenders by Aug. 7.
HEBDEN BRIDGE AND MYTHOLMROYD GAS BOARD. Tenders by Aug. 12.

**Coal** *(continued)*.

LYMM URBAN DISTRICT COUNCIL. Tenders by Aug. 22.
OLDHAM GAS DEPARTMENT. Tenders by Aug. 11.
SHEFFIELD GAS COMPANY. Tenders by Aug. 6.
SLIGO GASLIGHT COMPANY. Tenders by Aug. 13.

**Meters.**

DEWSBURY GAS DEPARTMENT. Tenders by Aug. 15.

**Pipes, &c.**

DEWSBURY GAS DEPARTMENT. Tenders by Aug. 15.

**Reservoir, &c.**

BIRMINGHAM WATER DEPARTMENT. Tenders by Sept. 18.

**Sulphuric Acid.**

DEWSBURY GAS DEPARTMENT. Tenders by Aug. 15.

**Tar and Liquor.**

LYMM URBAN DISTRICT COUNCIL. Tenders by Aug. 22.

## NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

*No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.*

**COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.**

**Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.**

**Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.**

**TERMS OF SUBSCRIPTION to the "JOURNAL."**

**United Kingdom: One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.**
Payable in advance. If credit is taken, the charge is 25s. a year.

**Abroad (in the Postal Union): £1 7s. 6d., payable in advance.**

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

**Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.**


OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 171, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

J. E. C. LORD, Ship Canal Tar-Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, London, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones 815 Oldham, and 2412 Hop, London.
Telegrams—
"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

BENZOL
AND
CARBURINE FOR GAS ENRICHING
ALSO
THE MAXIM PATENT CARBURETTOR.

For Prices, &c., apply to
THE GAS LIGHTING IMPROVEMENT CO., LTD
SALISBURY HOUSE, LONDON WALL, E.C.
Telephones: 4452 and 4453 London Wall.
Telegraphic Address: "Carburine, London."

OXIDE OF IRON.
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT.
PAINT FOR GAS-WORKS.
"KLEENOFF," THE COOKER CLEANER.
BALE & CHURCH, LTD.
5, CROOKED LANE, LONDON, E.C.

TAR WANTED.
THOMAS HORROCKS & SONS, LTD.,
Albert Chemical Works,
NORTON STREET, MILES PLATTING, MANCHESTER.
Pitch, Creosote, Brick and Fuel Oils, Benzol, Solvent Naphtha, Carbolic, Sulphate of Ammonia.

AMMONIA Waste Liquor Disposal.
Purification Plant.
Results Guaranteed. No Working Costs.
JOHN RADCLIFFE AND CO., Chemists and Engineers, Winchester House, OLD BROAD STREET, E.C.